MISSOURI BOTANICAL GARDEN

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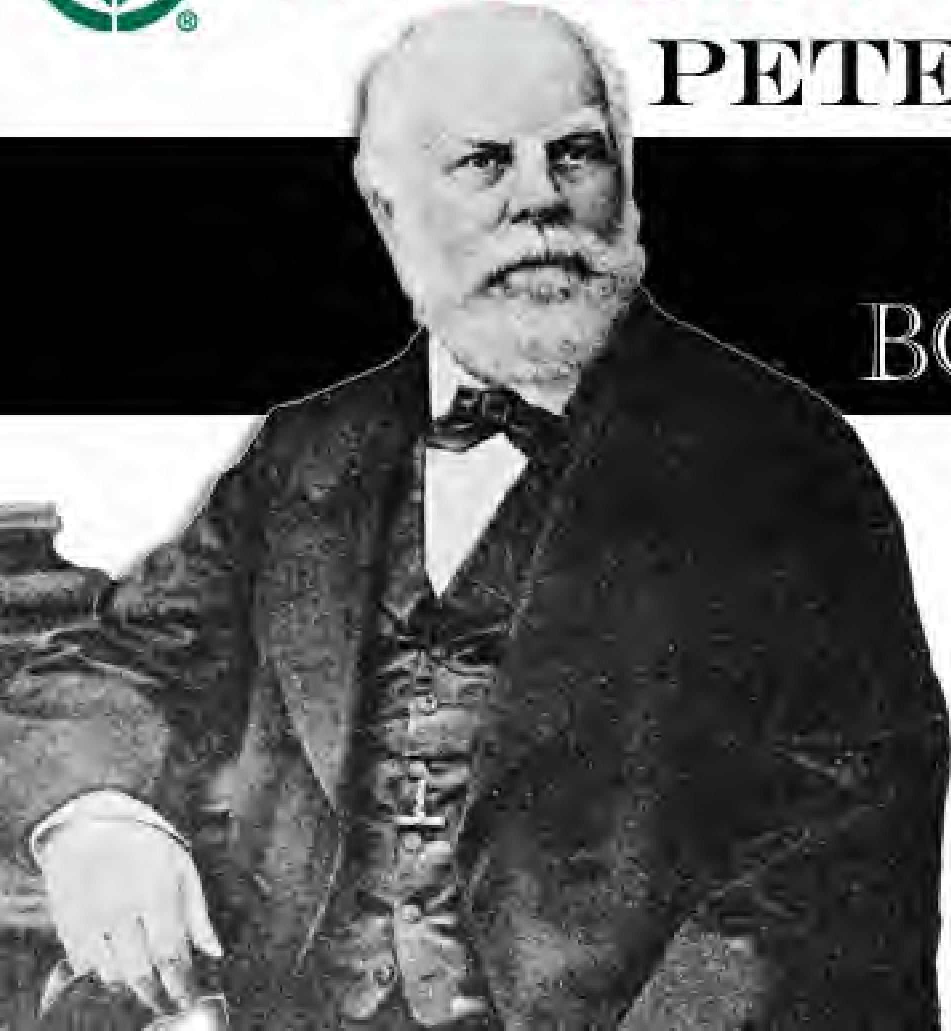


GEORGE ENGELMANN BOTANICAL NOTEBOOKS

Pagination Note:
Since many of the items lack a specific page number, the page number displayed online refers to the sequentially created number each item was given upon cataloging the materials.

July	2	4	......	......	......	3
August	3	......	1	......	1	2
September	4	......	......	1	4	8
October	3	1	1	1	7	1
November	2	3	......	7	......	7
December	2	3	......	......	......	6
	50 + el.	36 + el.	23 — el.	28 — el.	15 no el.	34 no el.

Snowing was accompanied

	By Positive Electricity.		By Negative Electricity.		By no Electricity.	
	In 1861.	In 1862.	In 1861.	In 1862.	In 1861.	In 1862.
January	3	9	......	2	......	......
February	12	8	......	1	......	......
March	3	12	......	......	......	......
October	......	1	......	......	......	......
November	......	4	......	......	......	......
December	5	2	2	......	......	1
	23 + el.	36 + el.	2 — el.	3 — el.	......	1 no el.

REMARKS.

The monthly mean of atmospheric electricity in 1862 was not quite so regular as that in 1861. While in 1861 an un-

W. Brasshiansi
vera

42

Or we may divide the twelve months of each year into three groups. The first group with the highest electricity is formed by the months of January, February, November and December; the second with a mean electricity by the months of March, April, May and October; and the third with the lowest electricity by the months of June, July, August and September.

The aggregate monthly mean of

The first group in 1861 is 52.9—in 1862, 54.6
The second " " 33.5 " 35.2
The third " " 14.1 " 10.5

Thus in 1861 the third group prevailed, and in 1862 the first and second. But these differences are so well balanced throughout the year, that the mean of the whole year in 1861 and in 1862 is exactly the same, namely, 8.4. Such an identity in the yearly result, even to decimals, is of course not to be expected every year; but it seems to prove, at least, that the yearly mean of electricity is as constant as that of temperature, of relative humidity, and of atmospheric pressure.

The third table, showing the daily periodicity of atmospheric electricity, confirms the daily two maxima and two minima of electricity as an undeniable fact.

7833
MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

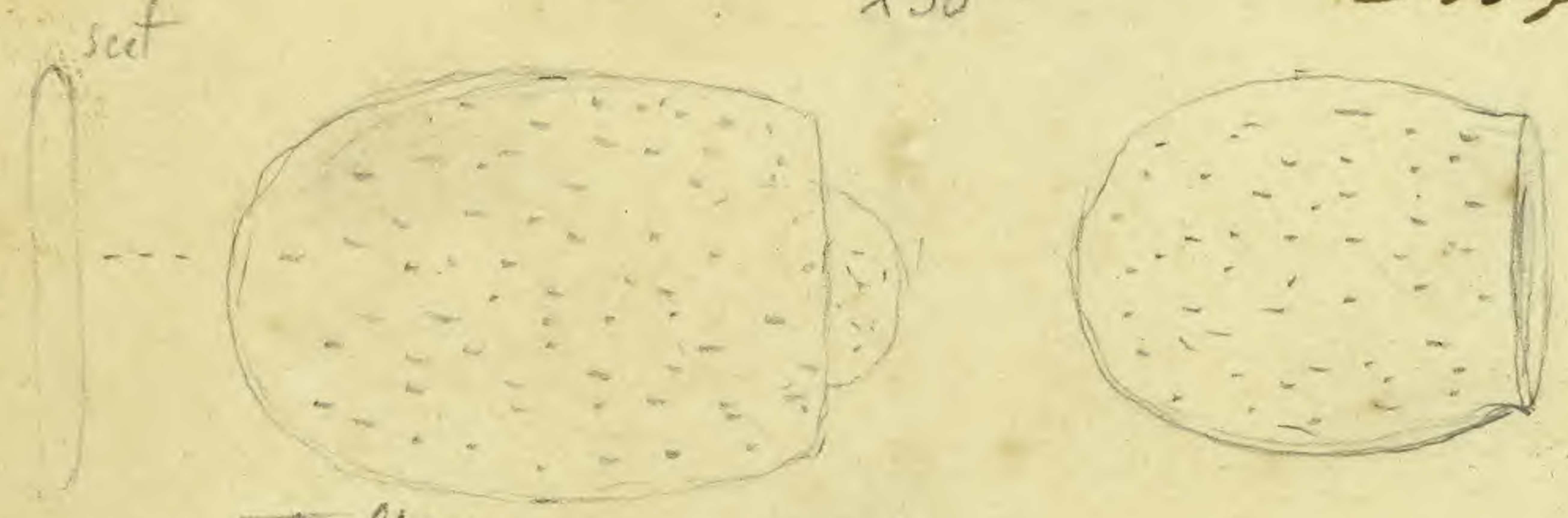
Wolffia Brasiliensis

Aug 7 1867

flat, disc-like

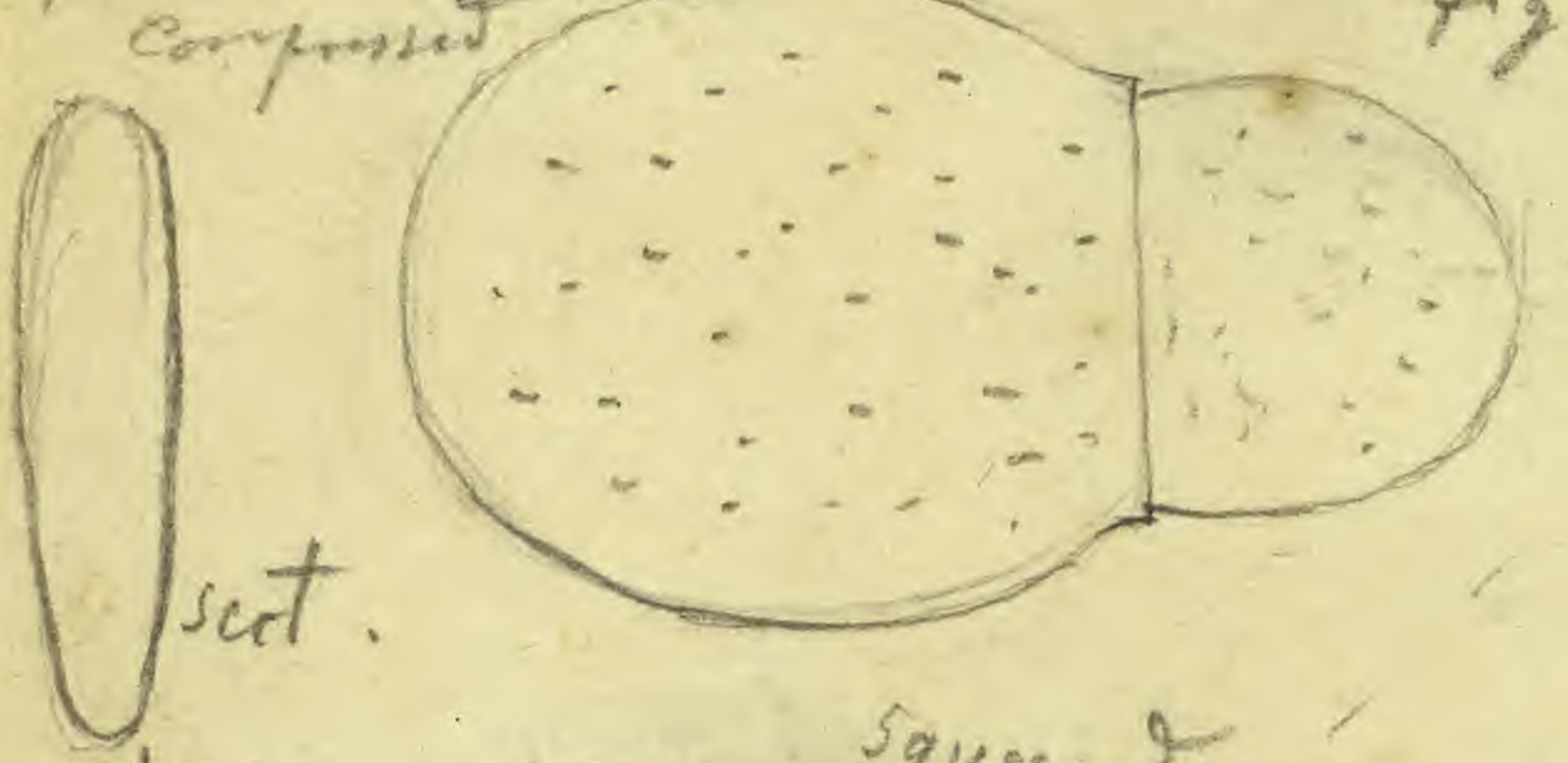
River Rouge Detroit,
Columbiana
with Wolffia arrhiza & Lemna
Dr Bigelow Aug 3 1867

×30



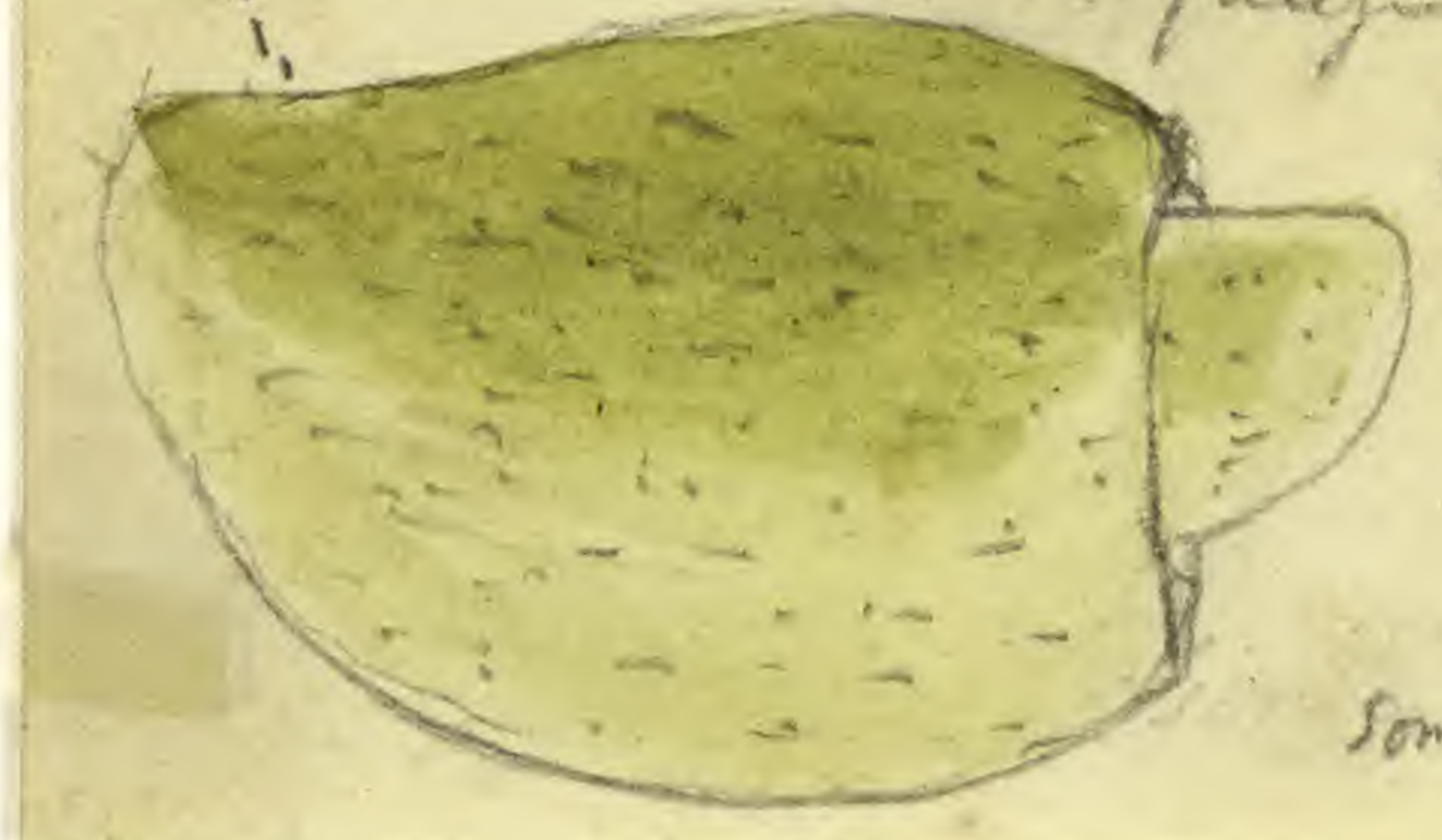
Specimens unnaturally compressed

fig. 1

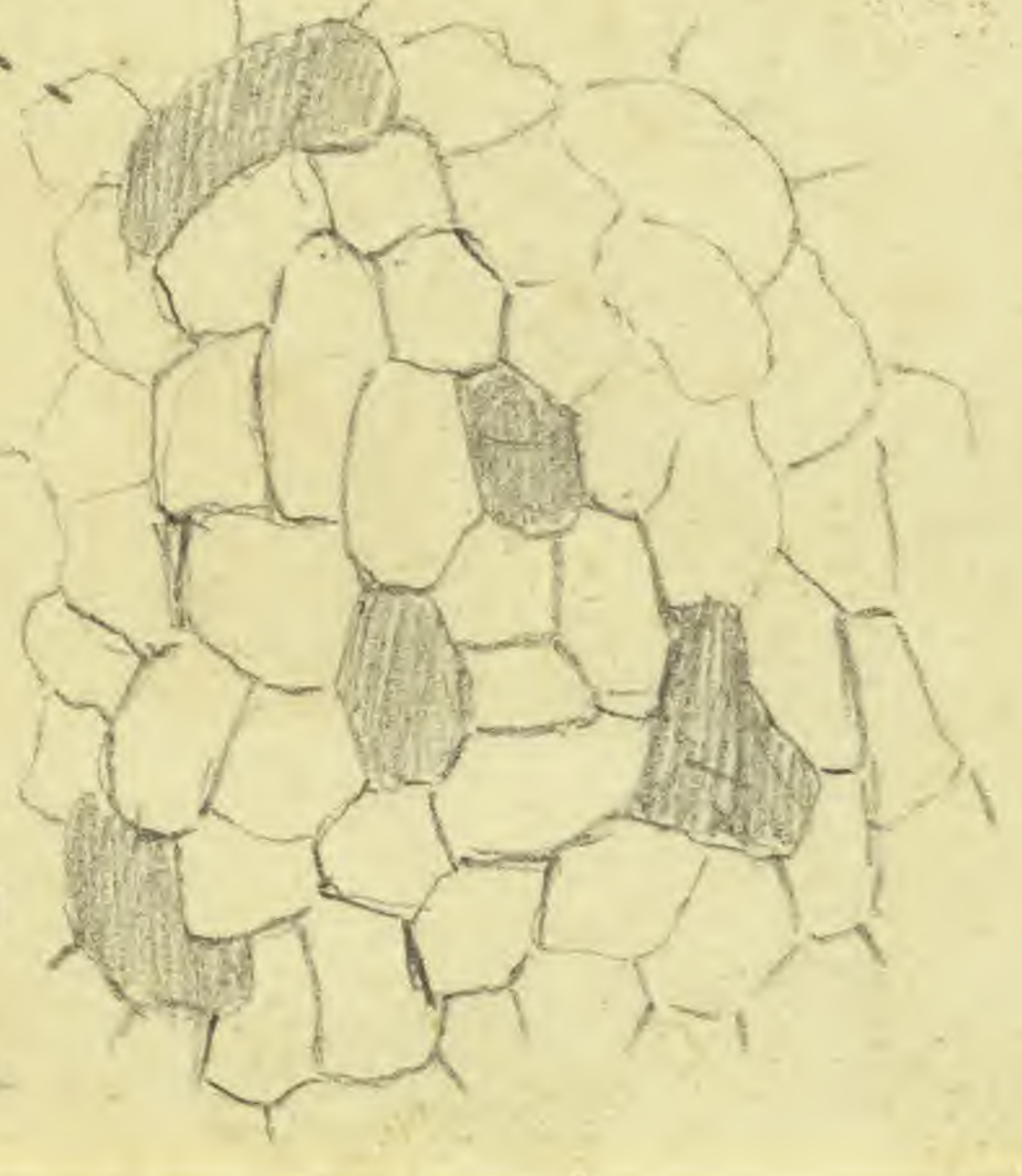


squeezed

fig 2

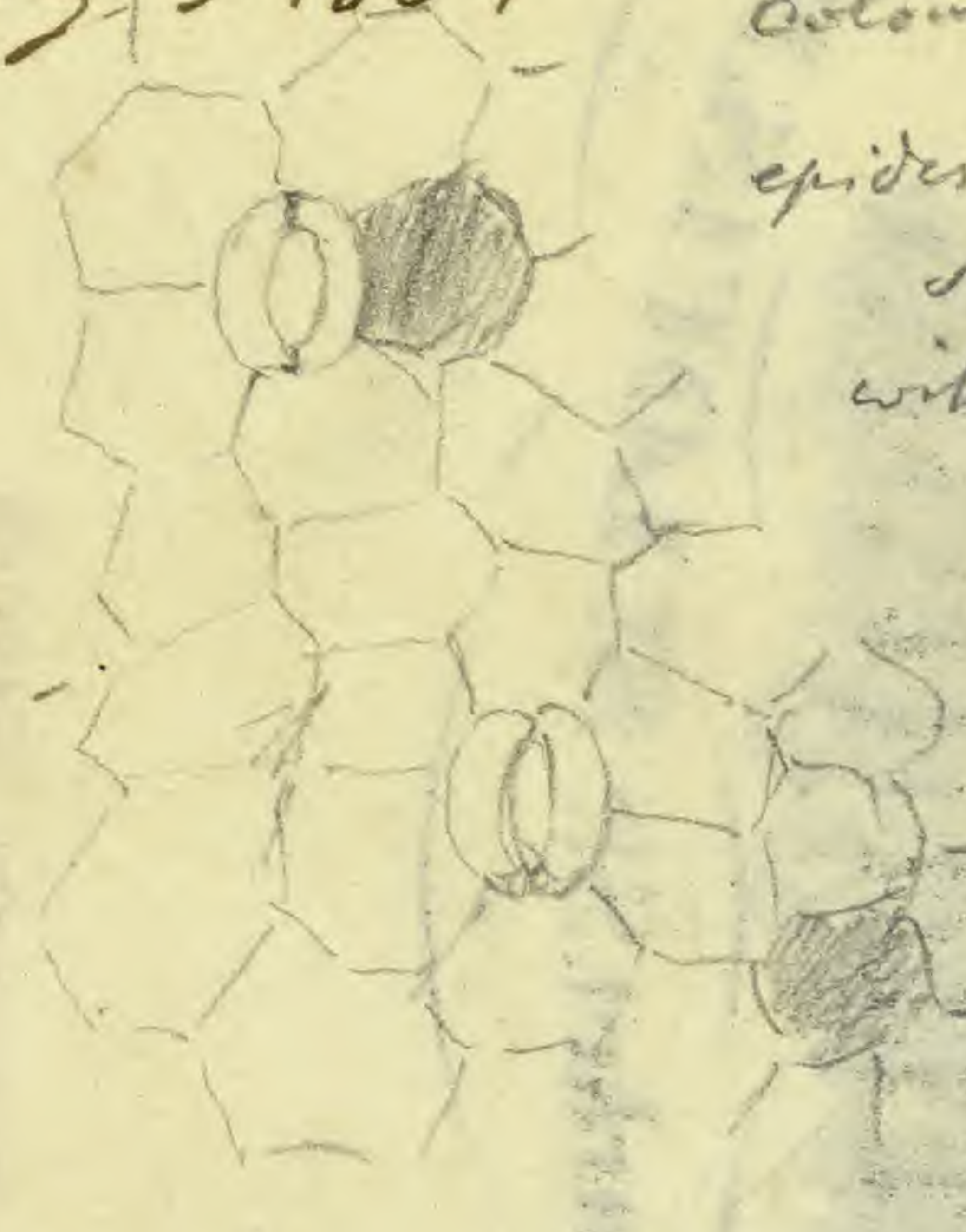


Epidermis cells ×280 some with dark contents

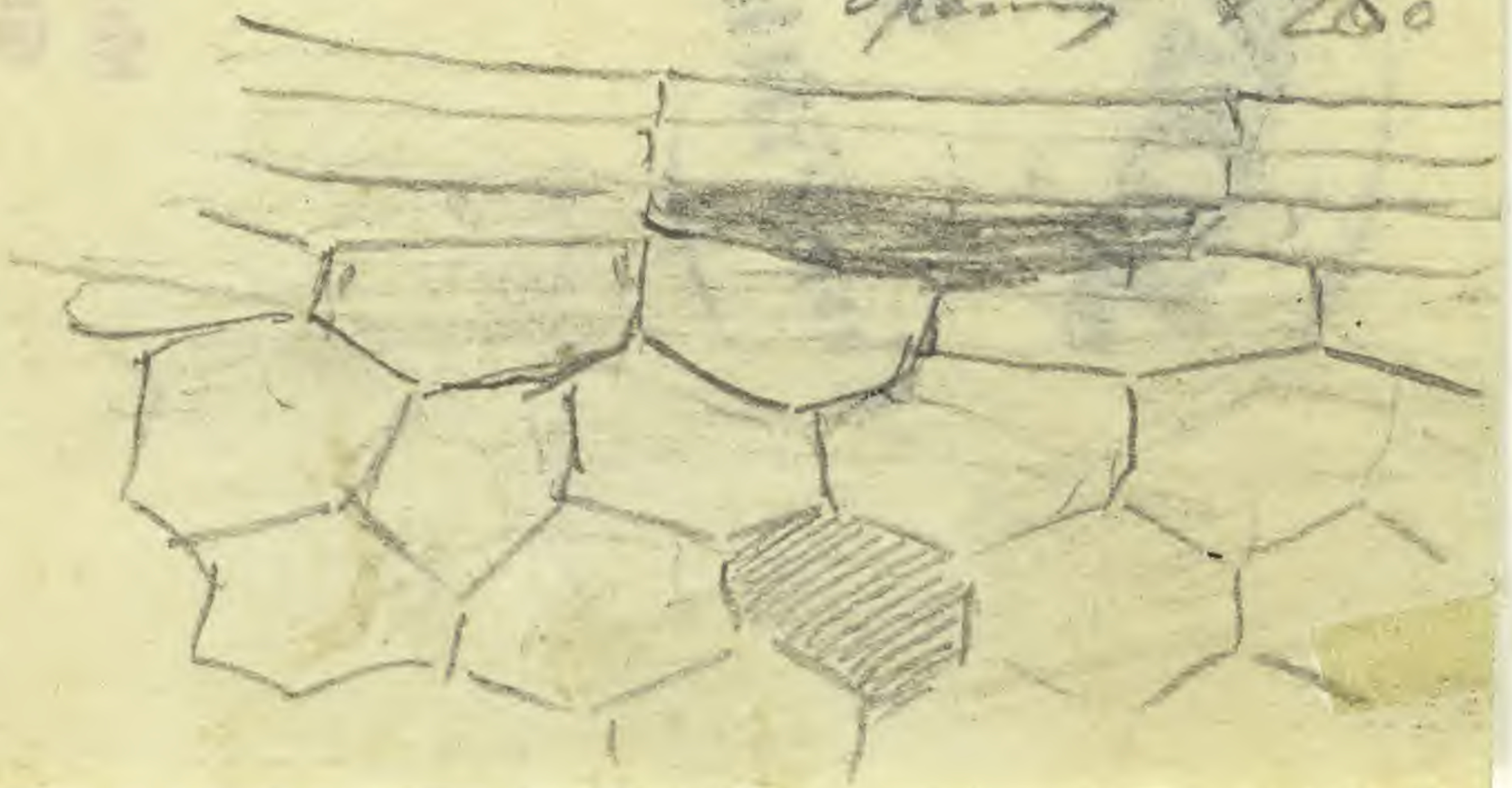


This belongs to the coloured specimen

epidermis of upper surface with stomata × 280



margin of proliferous opening ×280



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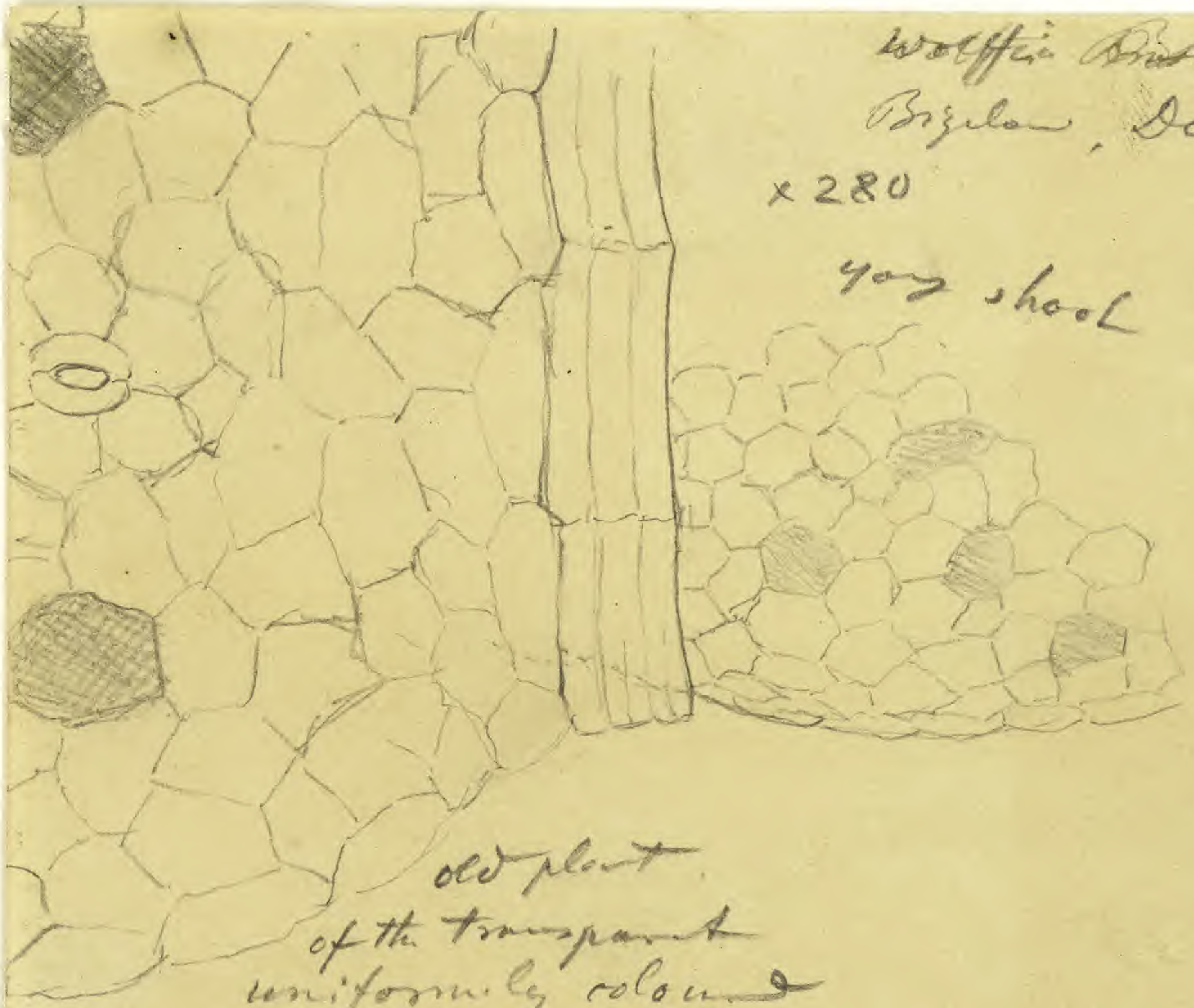
J. McKittrick & Co 56 N Main St

Wolffia Brasiliensis Aug 9 1867
Bigelow, Detroit (fresh)

x 280



young shoot

old plant
of the transparent
uniformly coloured
form; see figure
Aug 7 no 1.

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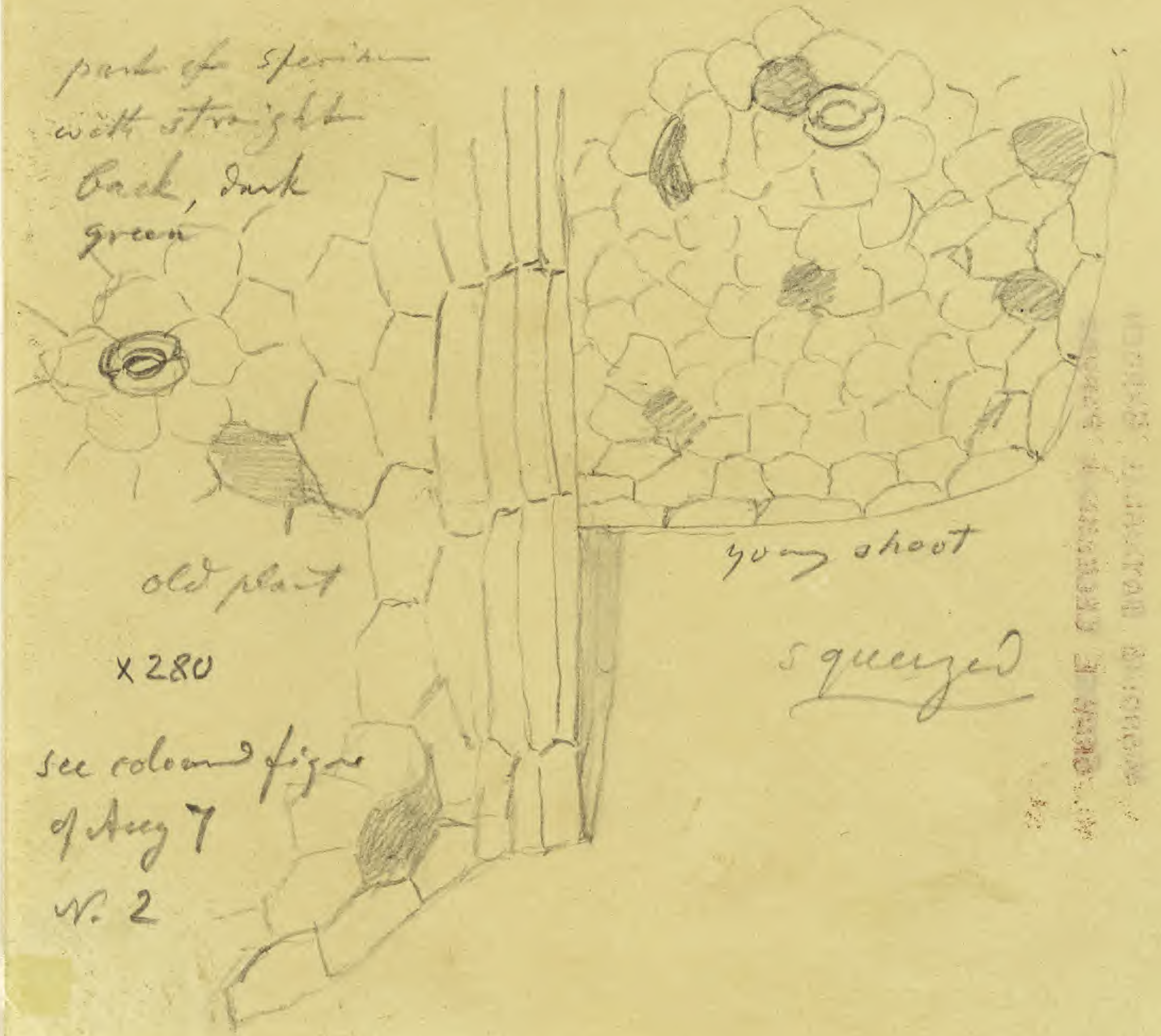
Detroit, Bigelow Aug 9 1867



part of specimen with straight back, dark green

old plant

x 280

see coloured figure of Aug 7 No. 2

young shoot

squeezed

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Wolffia Brasiliensis Aug 12 1867

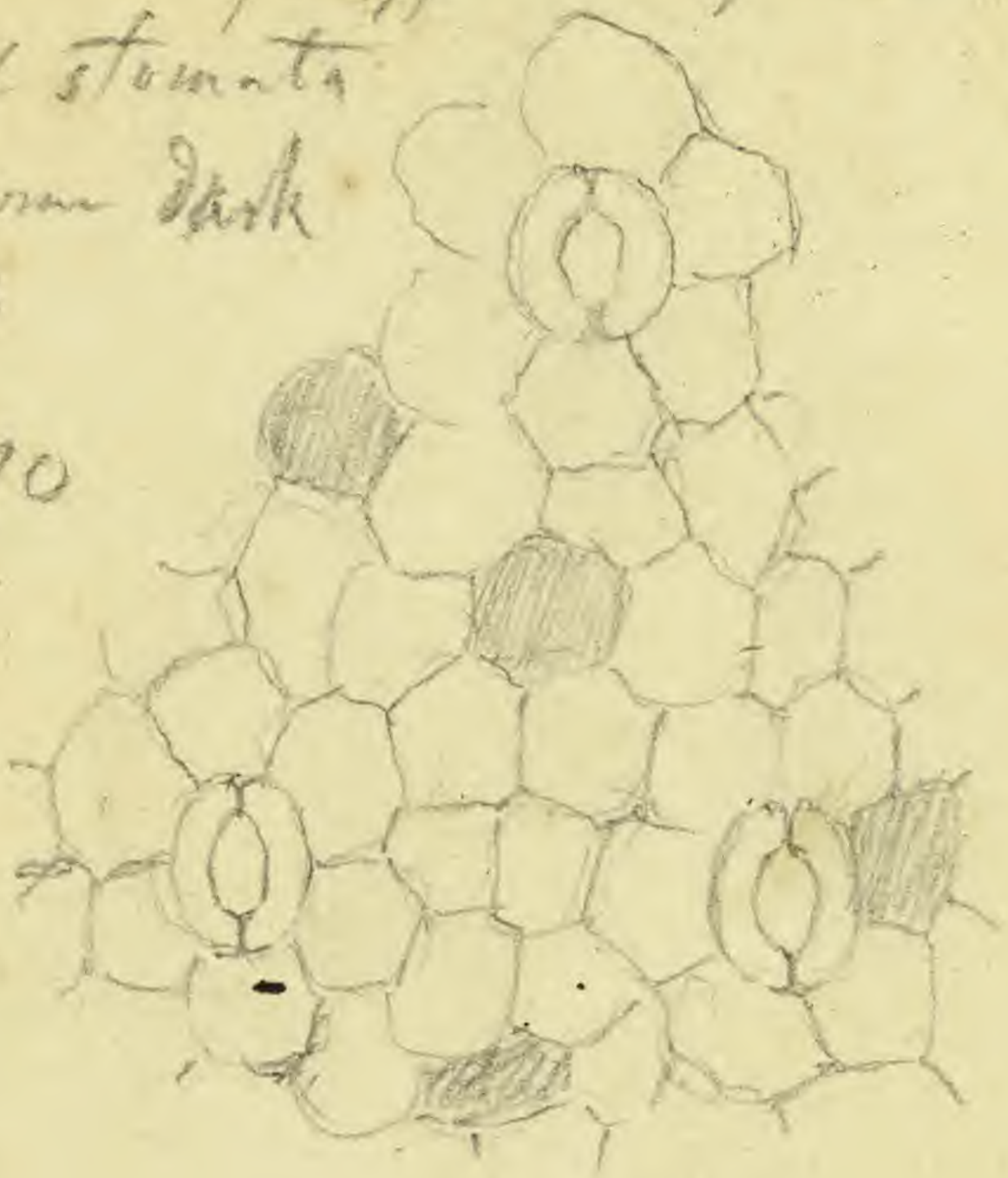
Ontario, Payne

Columbiana,

mixed with some W. arrhiza

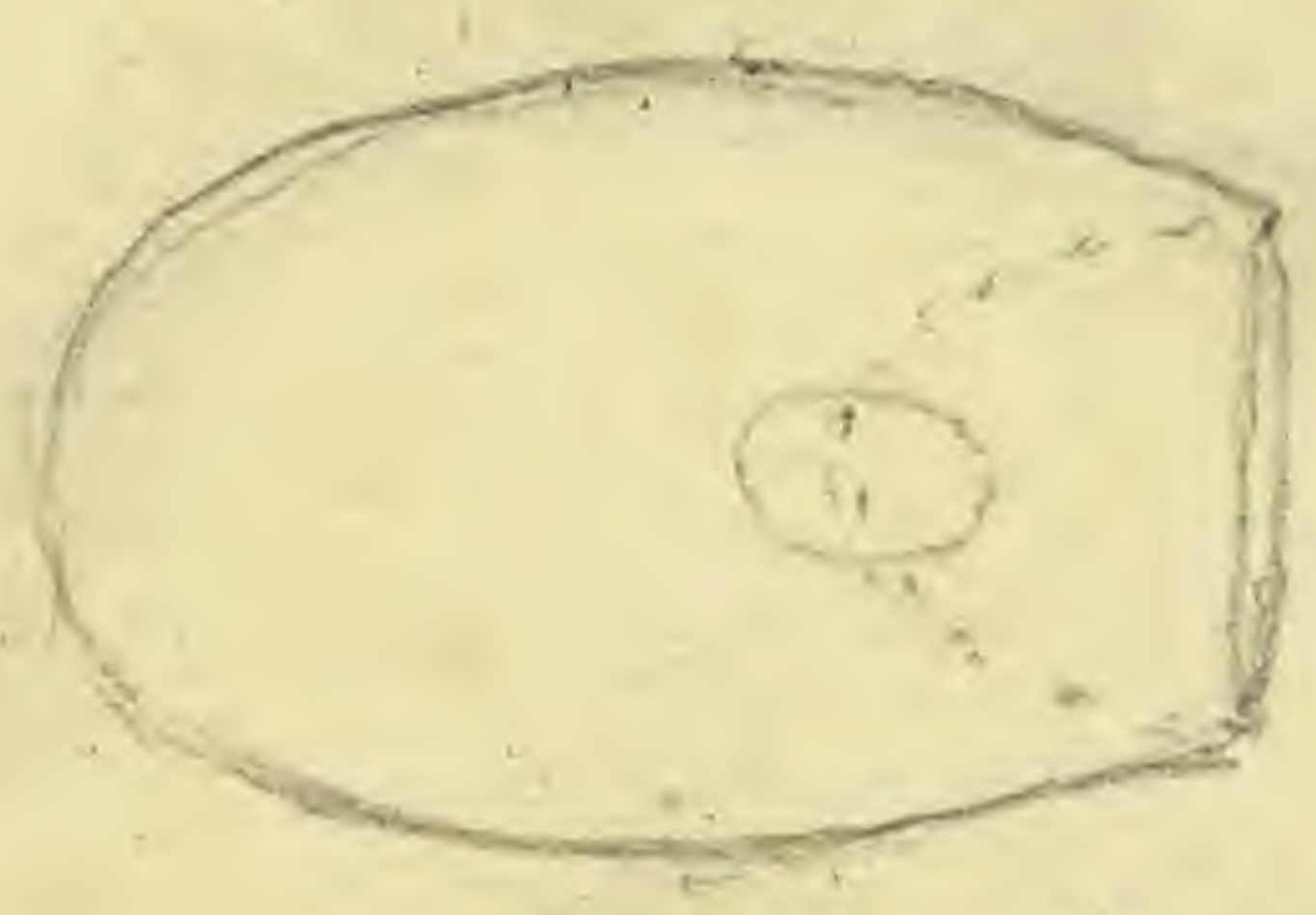
epidermis of upper surface full of stomata and some dark cells

x280



x30

0,7–0.8 mm lg



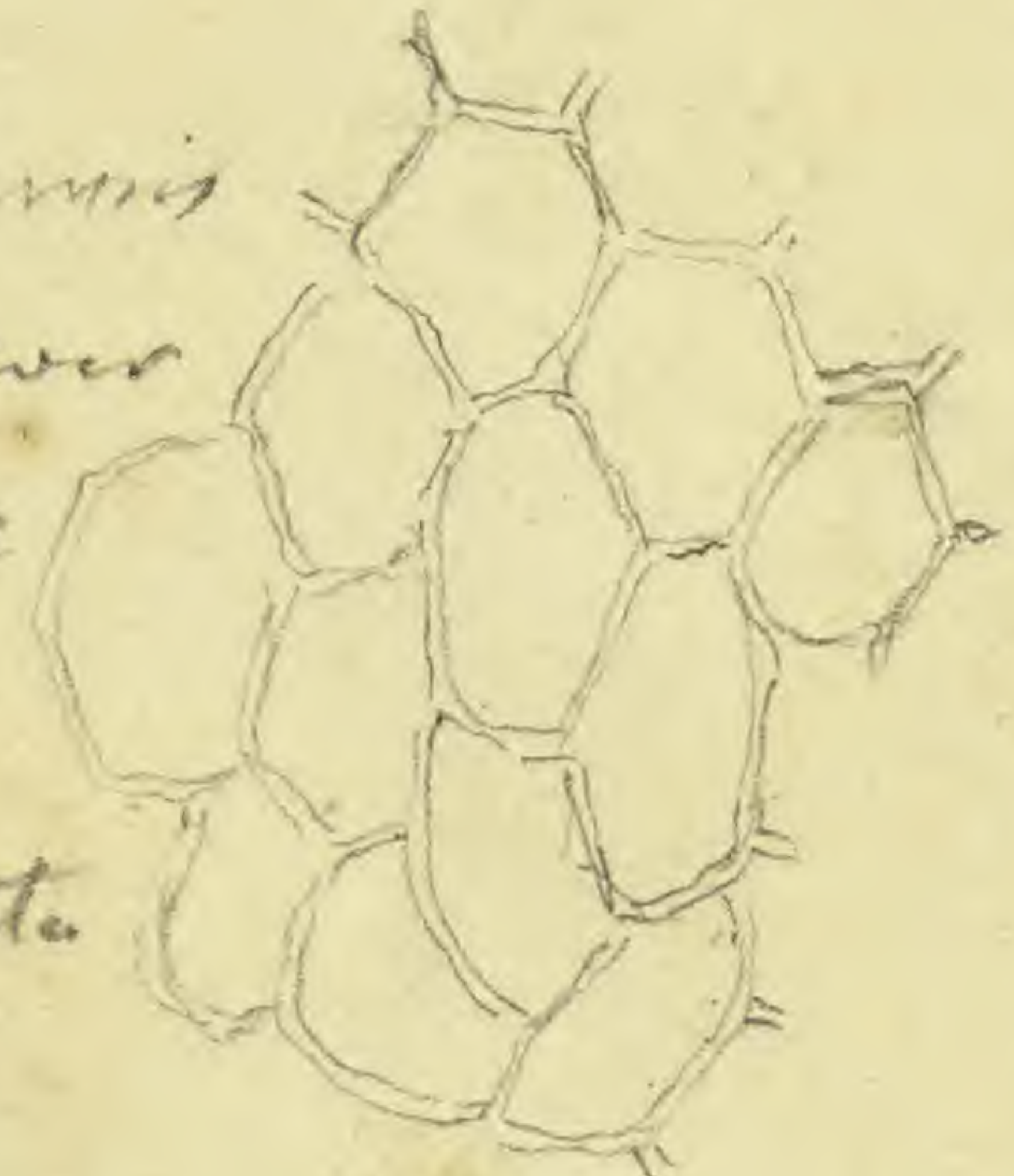
over 50 stomata on this small surface none on the lower

side view

Specimens soaked in water 1 hour, then boiled in dilute Potash solution, when these assumed their full shape, but the W. arrhiza remains somewhat shrivelled. The shape, the spots, the size of epidermis cells distinguish this greatly from arrhiza.

epidermis of lower surface

no stomata



this is the (more incomplete?) flat, colourless form

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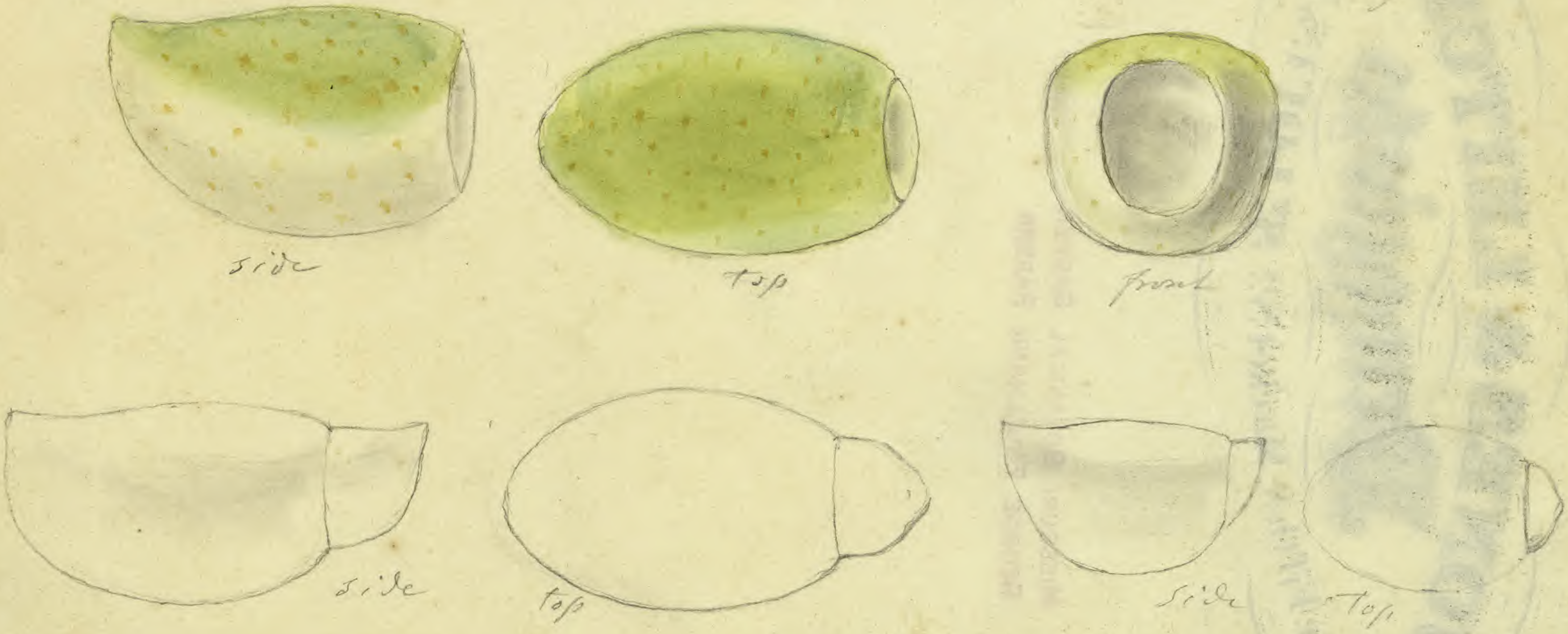
Wolffia Brasiliensis Aug 23 1867

x30 Rivière rouge, Detroit, Dr Bigelow

— largest & smallest specimens sent living



larger one $\frac{36 \times 24}{30}$ surface = 1.2 × 0.8 mm

fronds 0.8 - 1.2 mm long

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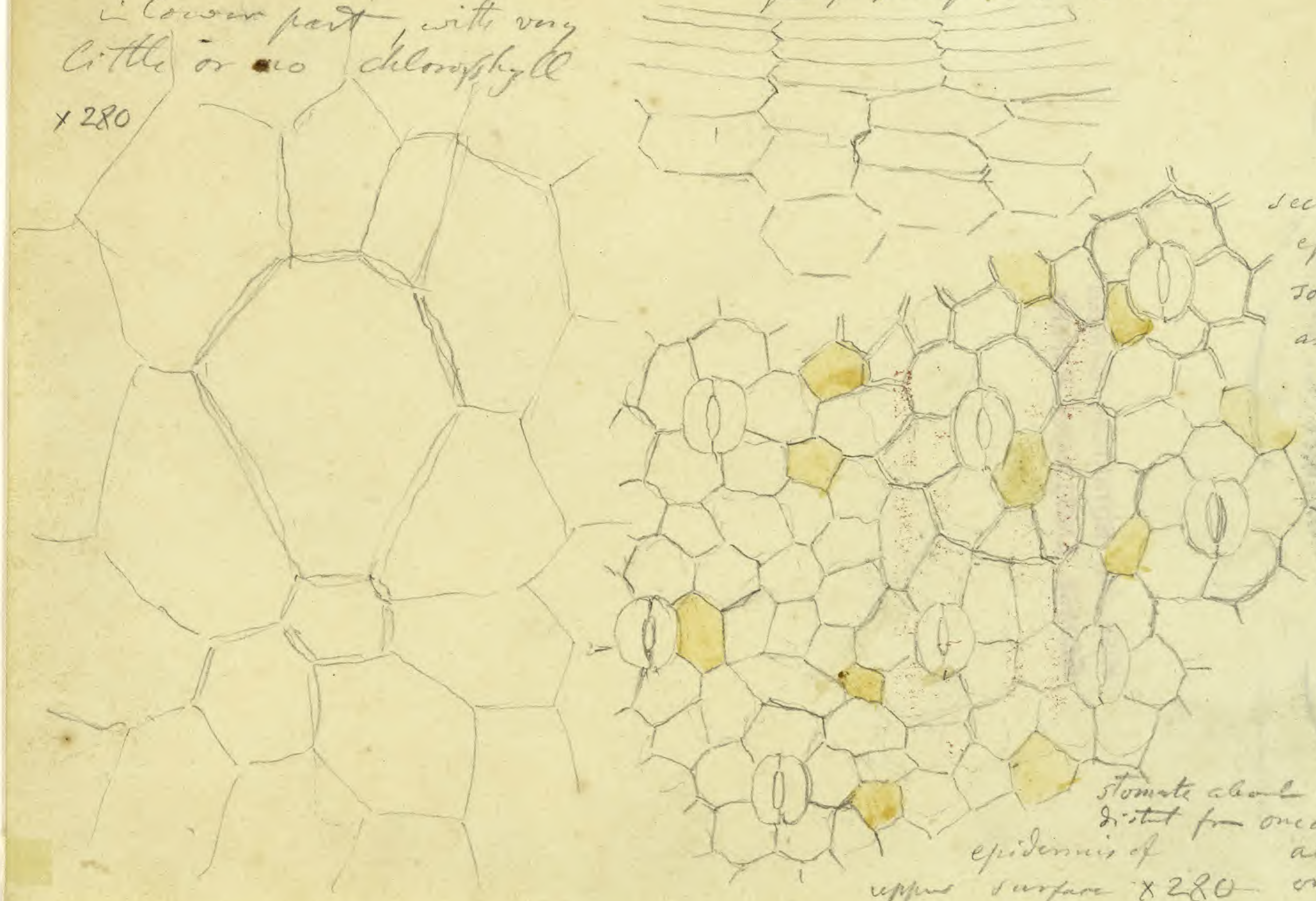
Wolffia Brasiliensis
Detroit
margin of proliferous opening x 280

Aug 23 1867

parenchymatous cells in lower part, with very little or no chlorophyll

x 280



the brown colour seems to be in some epidermis cells, sometimes it seemed as if they were under the epiderm

cells $\frac{5-8}{280}$ mm diam 0.018-0.028

stomata $\frac{7-8}{280}$ mm long & thin =0.025-0.028

stomata about 0.1 mm. distant from one another, therefore about 100 stomata on largest ones

epidermis of upper surface x 280

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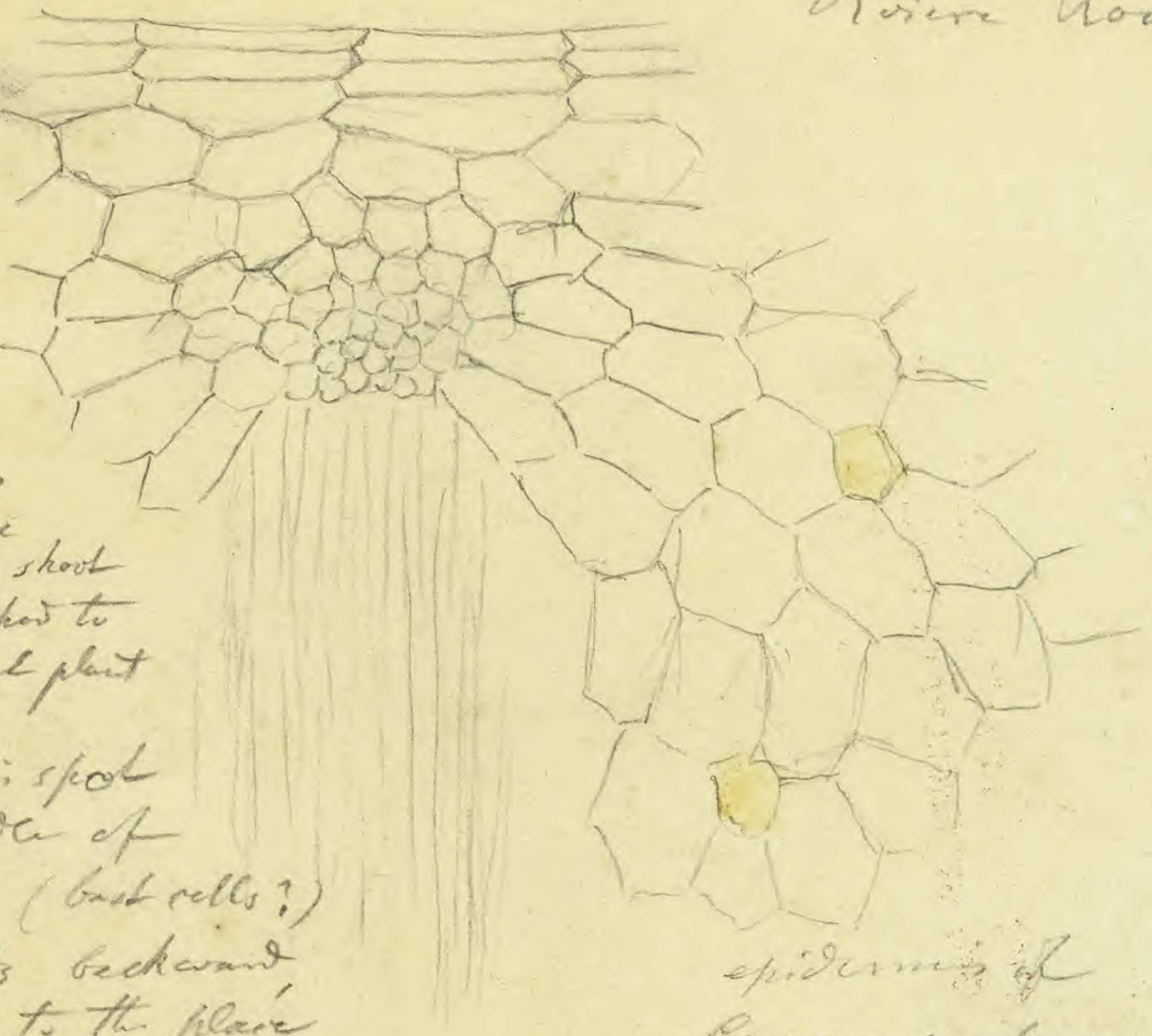
Wolffia Brasiliensis Aug 23 1867
Rivière Rouge, Detroit Bigelow



spot on the lower surface near the proliferous slit on which the shoot was attached to the parent plant

from this spot a bundle of fibres (bast cells?) extends backward probably to the place where the new offspring is being generated (of course the epidermis is here removed)

epidermis of lower surface

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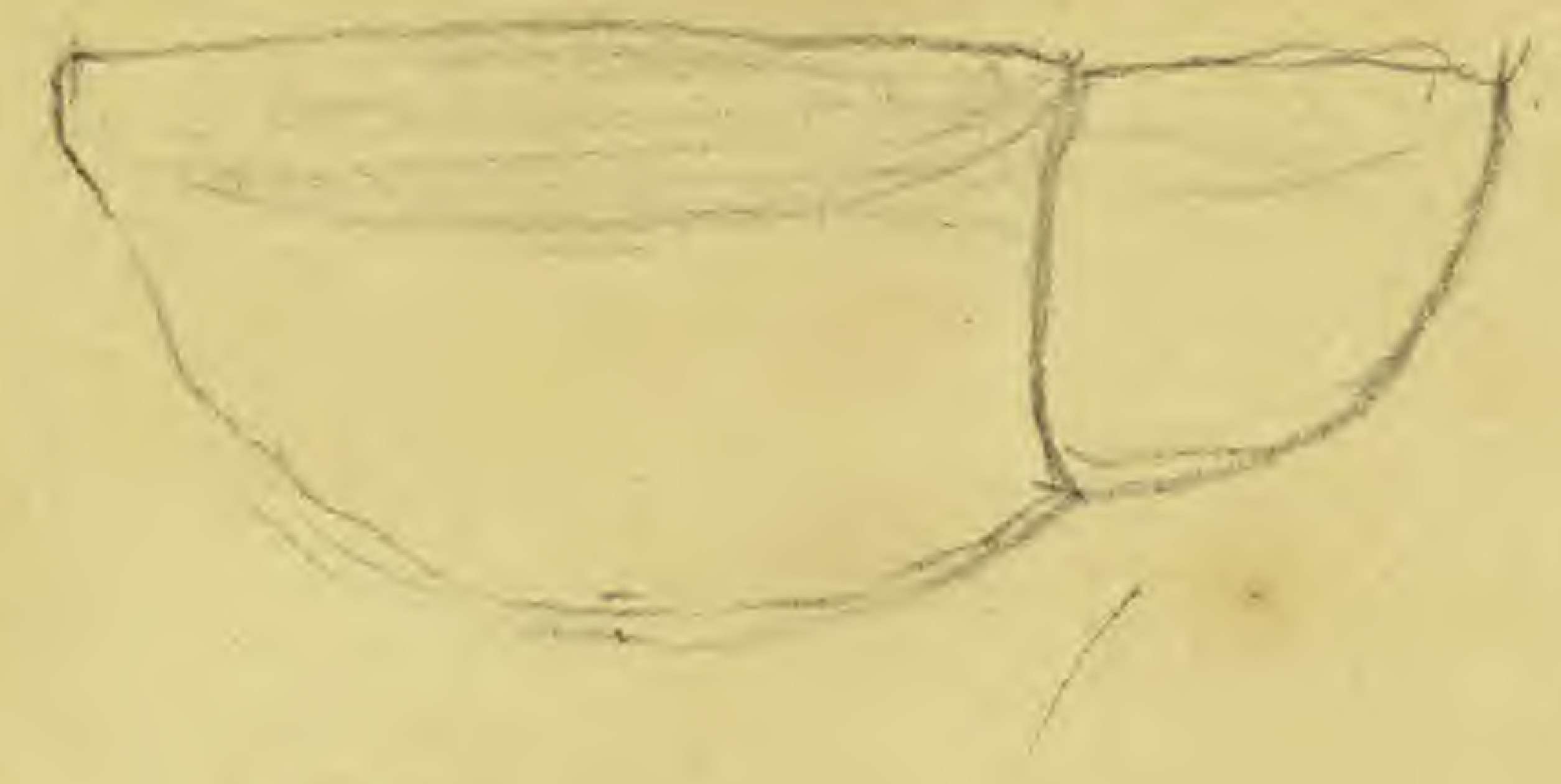
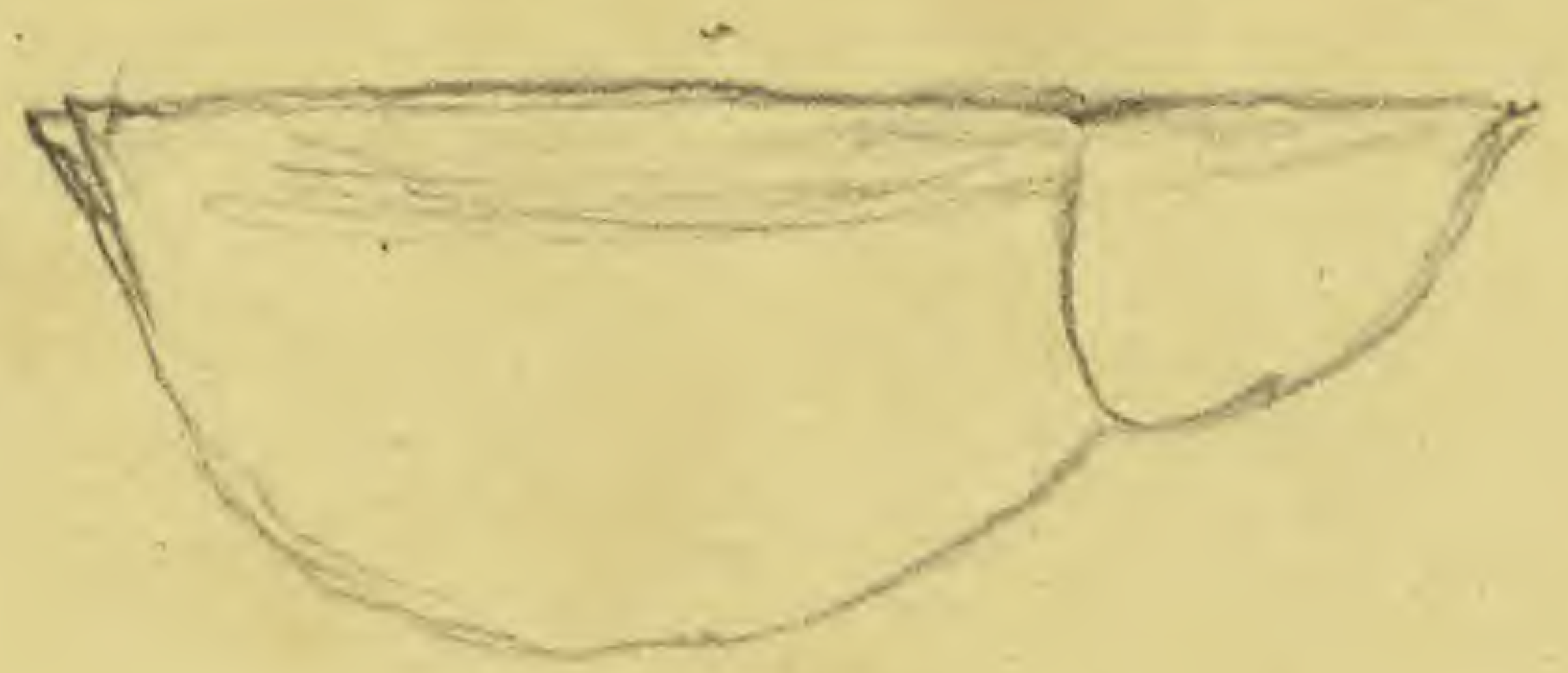
W. Brasiliensis. Sept 10 1867

E Hall mixed with
W. Columbiana
largest plant without bud 0.9 mm long



x30



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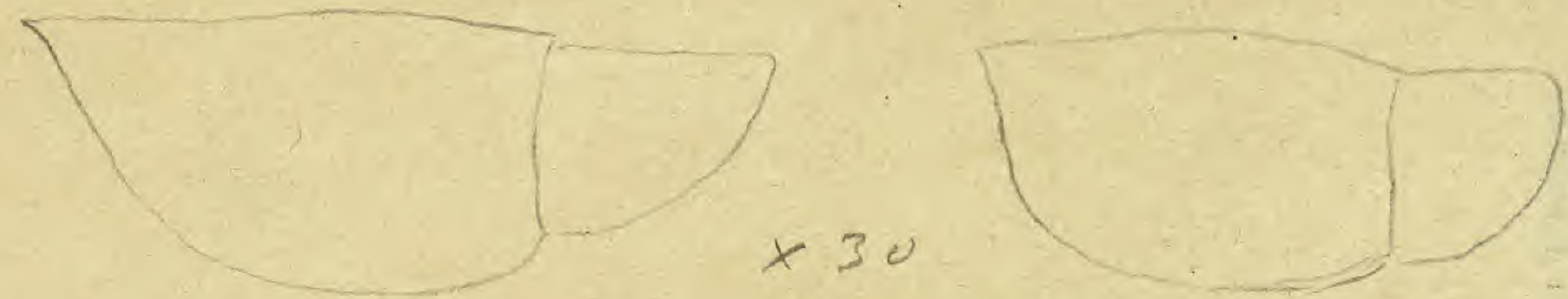
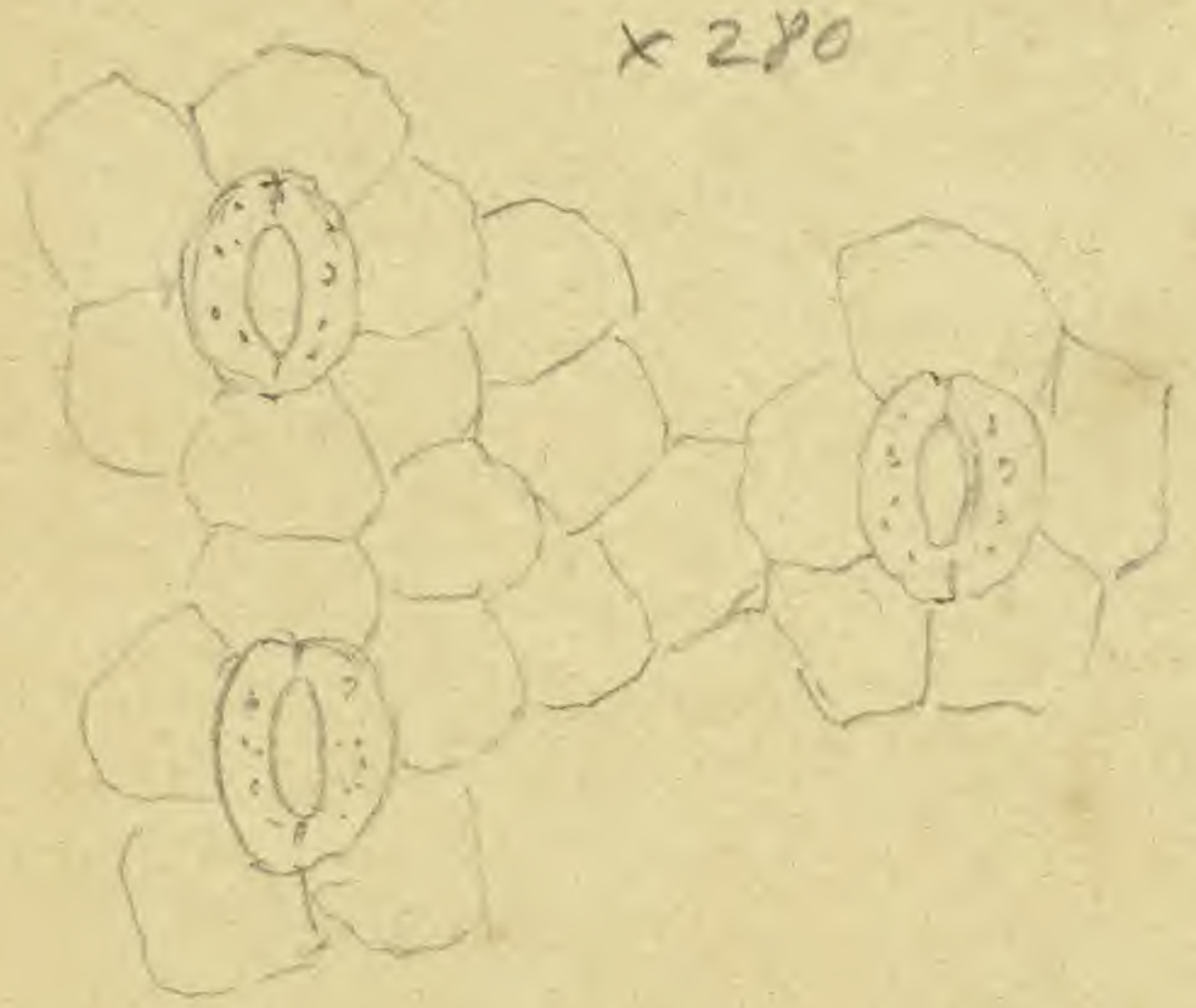
Wolffia Brasiliensis   Sept 21. 1867
Athens, E. Hall





most specimens are without the brown dots — these seem to develope more in old, almost decayed, palish specimens Evidently the brown cells are not of specific importance

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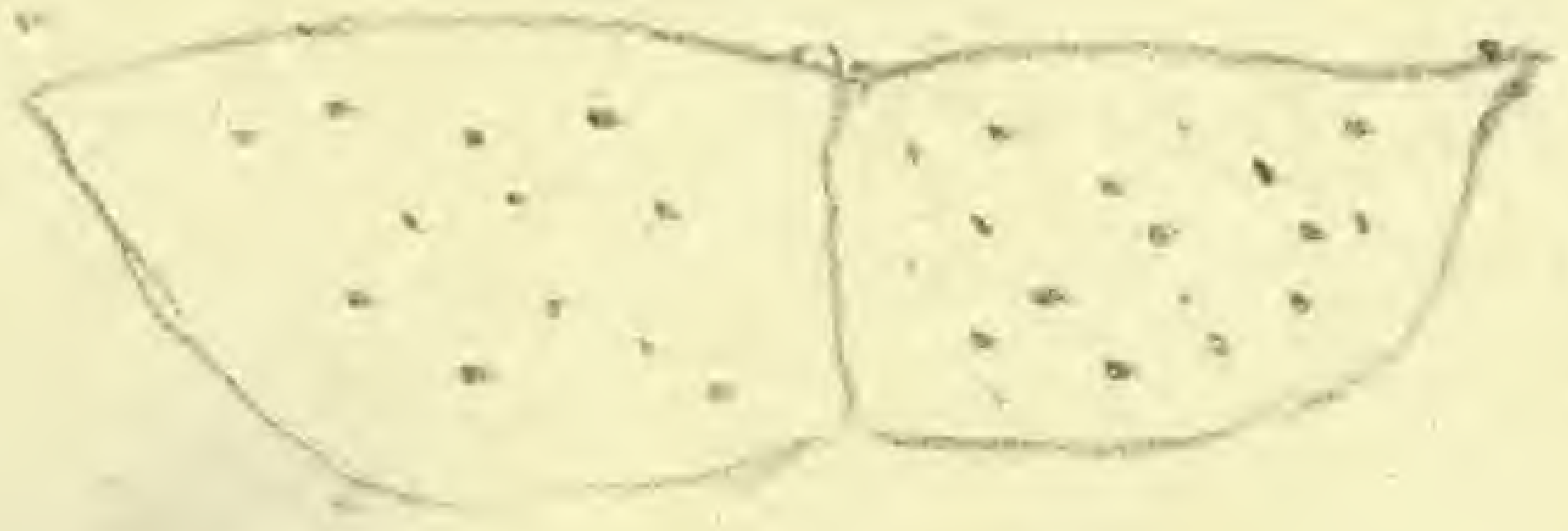
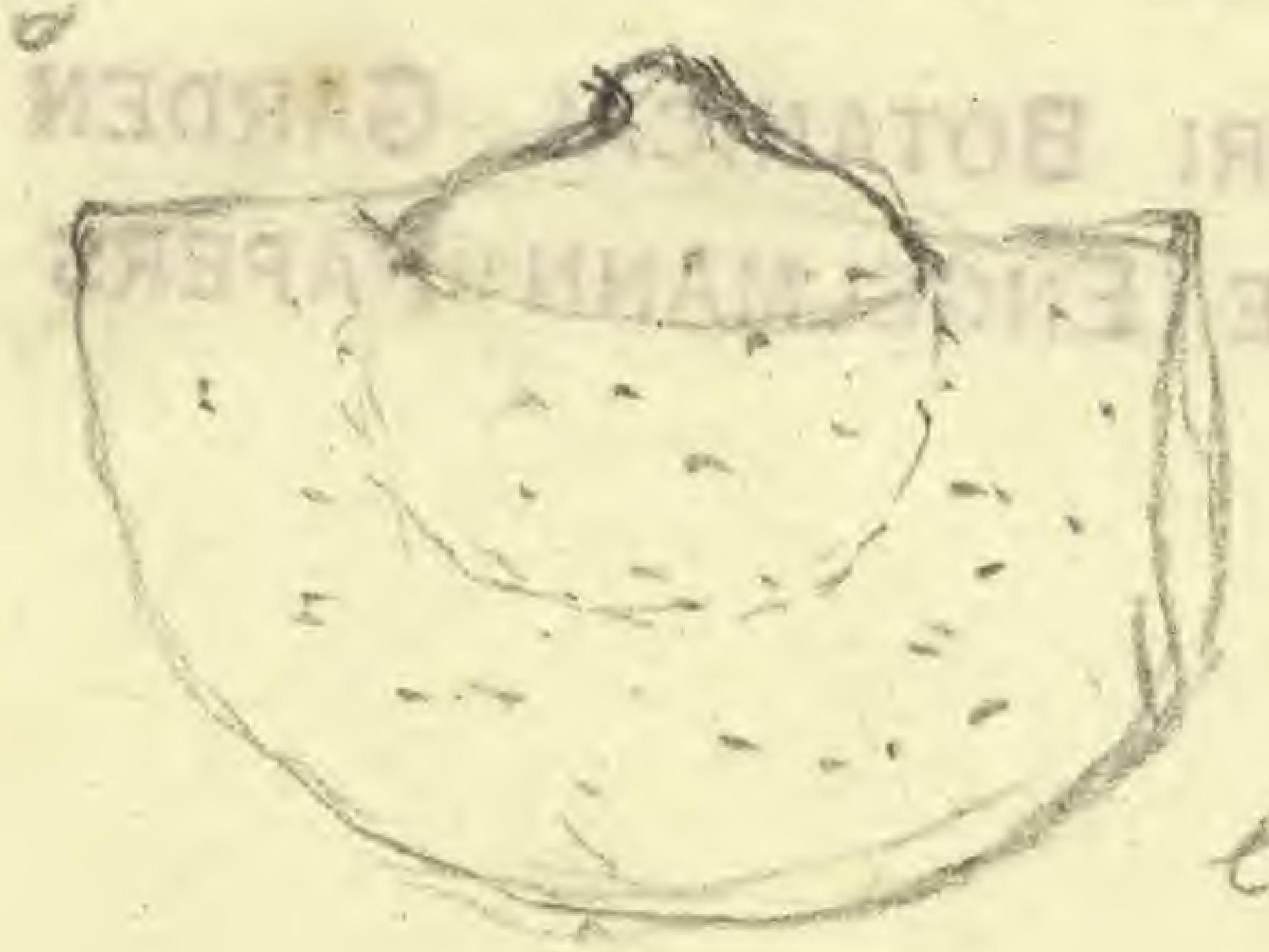
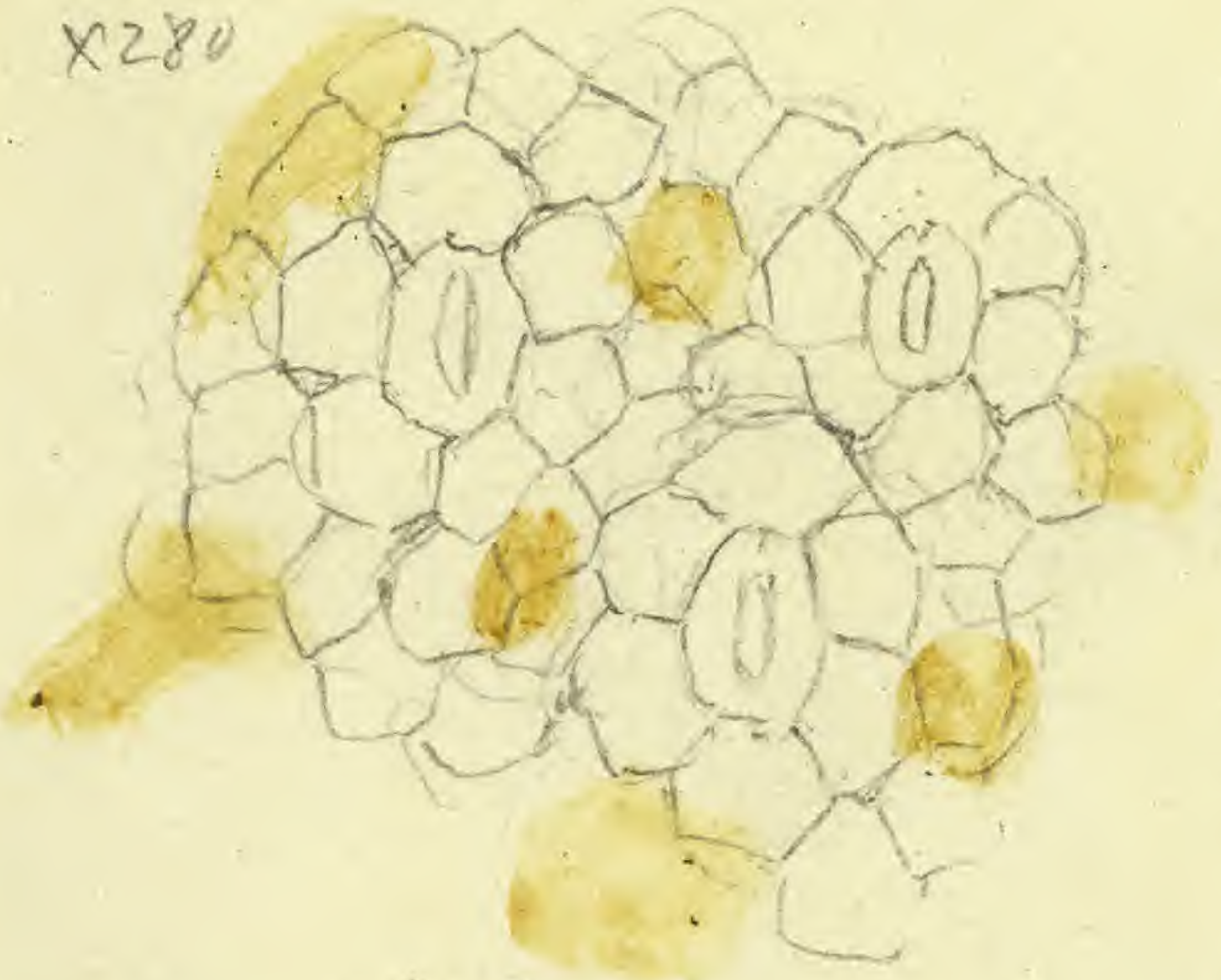
Wolffia Brasiliensis Nov 7 1867

Weddell leg 1845

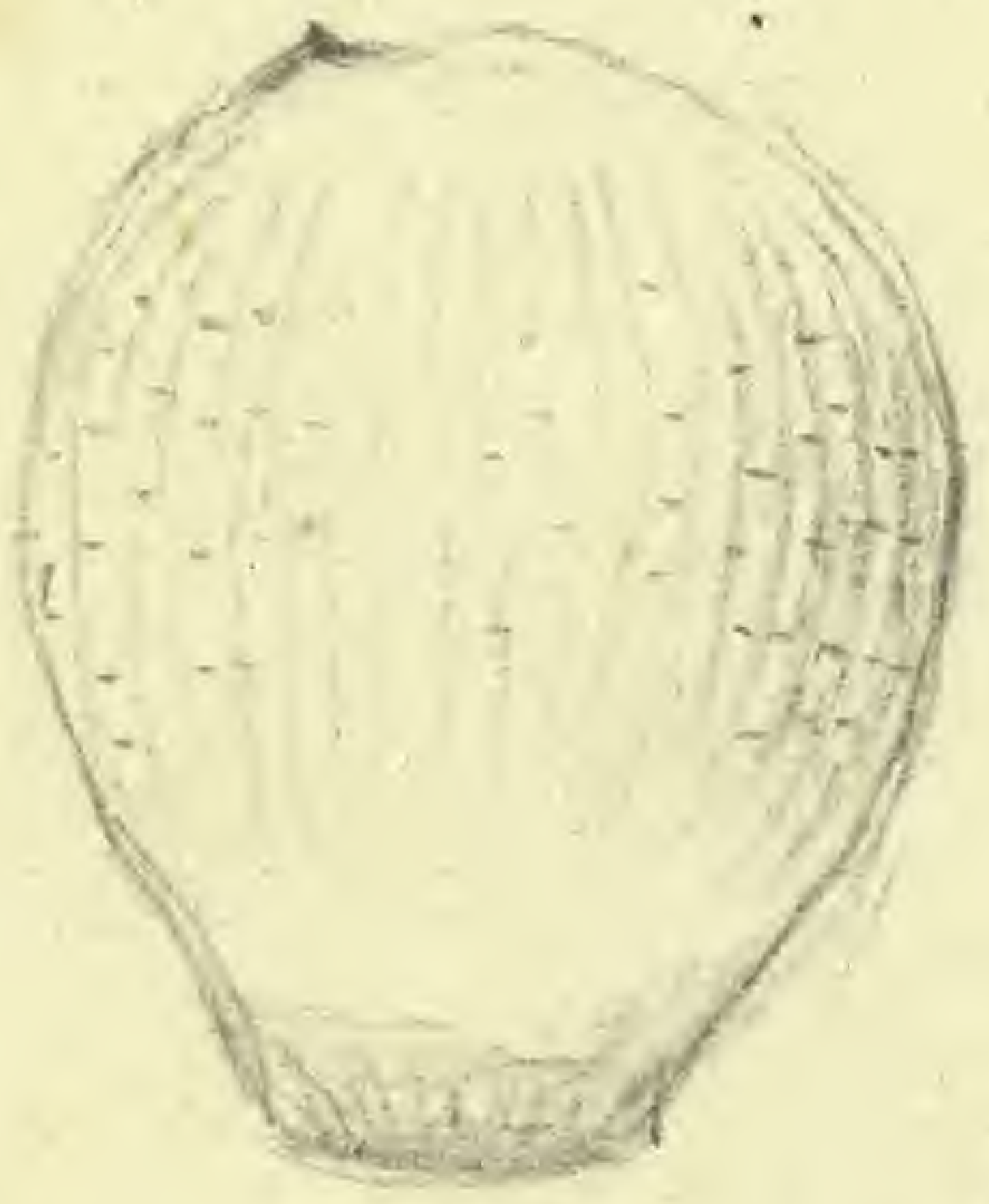


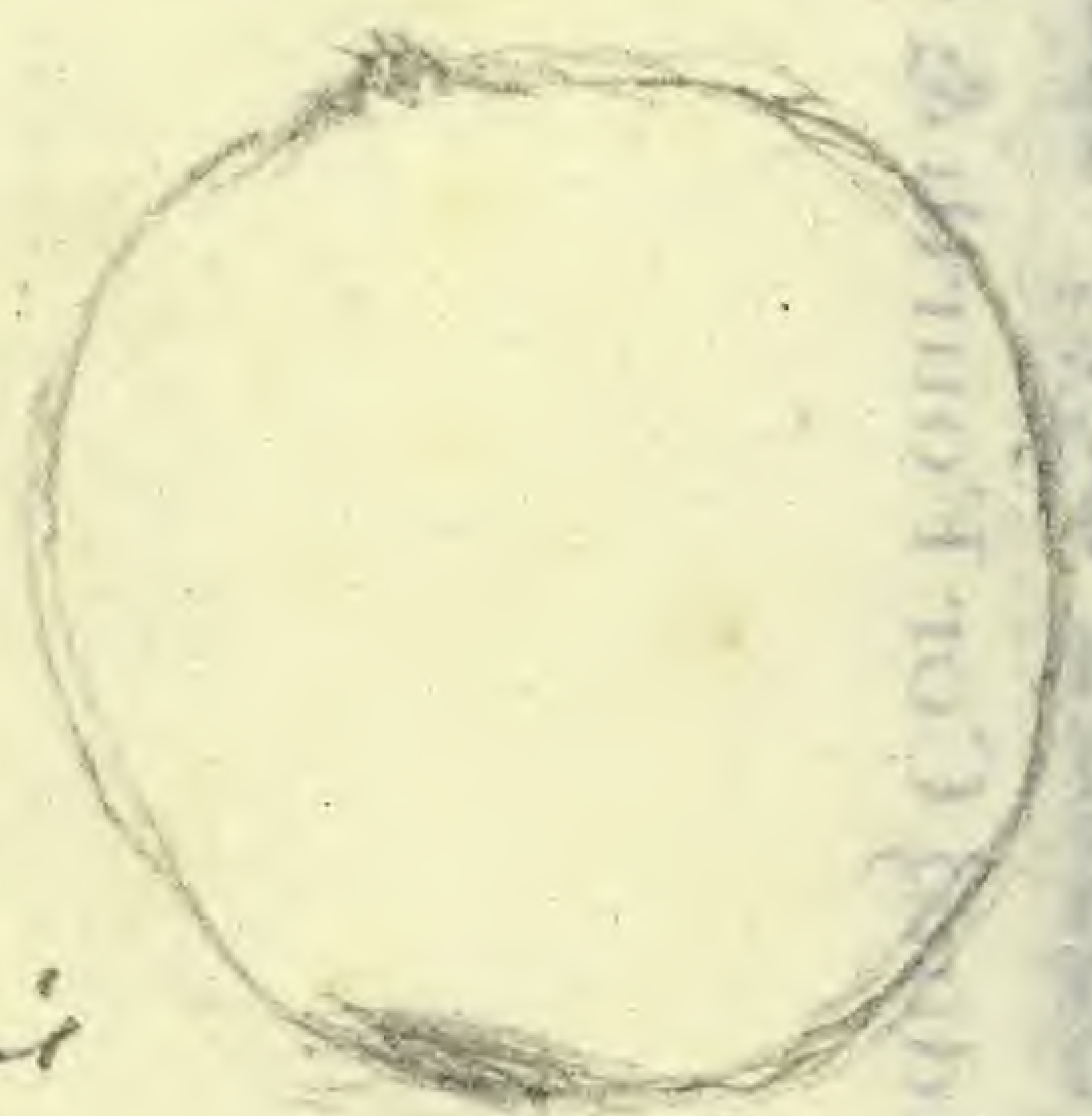


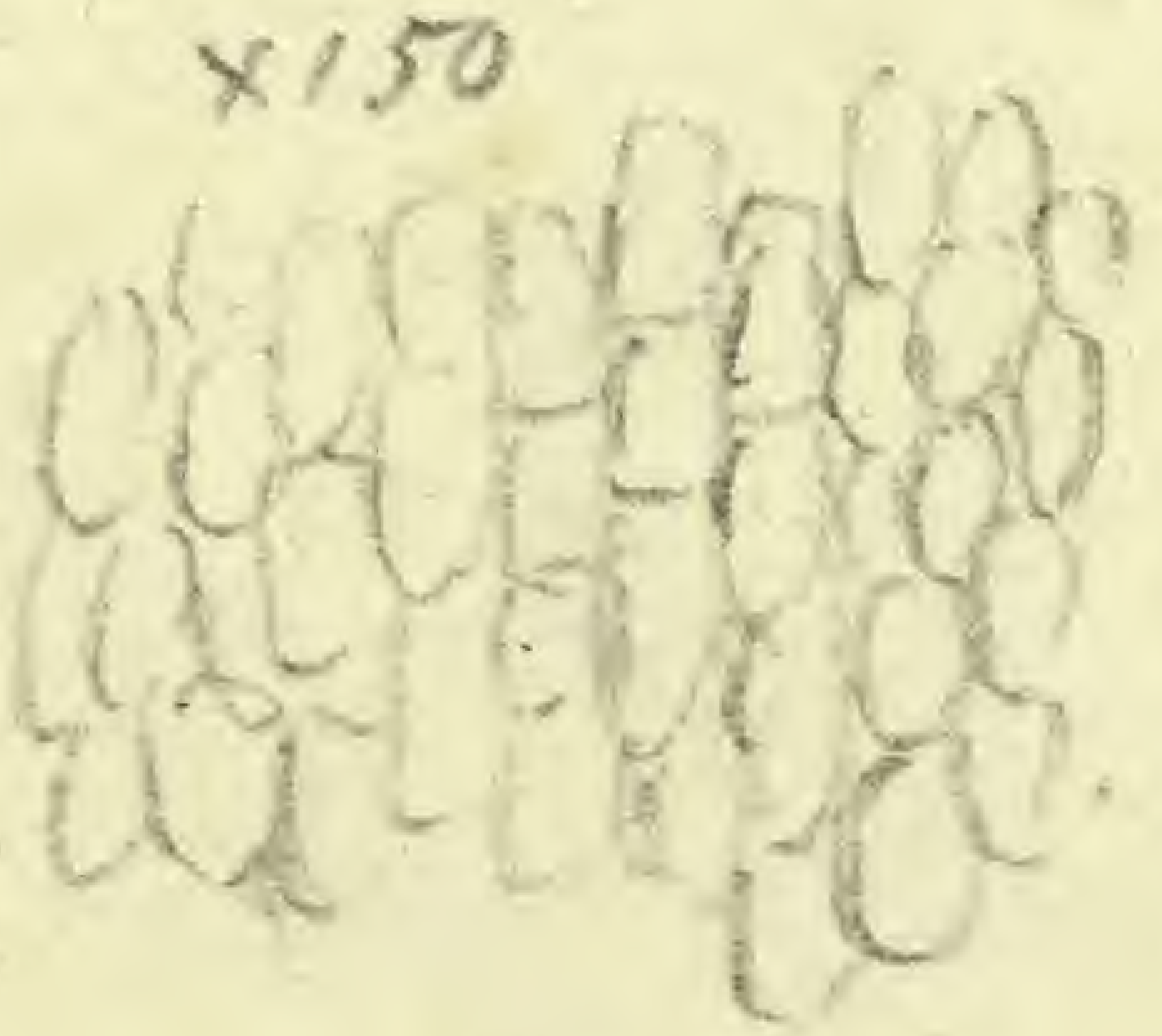


Stomata $\frac{6.5 - 7.5}{280}$

= 0.023 - 0.026 mm







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Walp. Ann 3. p. 496

Wolffia Brasiliensis Weddell, Ann. sc. nat.
3 Ser. 12. 169 t. 8

Frondibus ovatis solitariis geminisque epidermide nodulis punctiformibus inspersa, rima basilari inappendiculata.

On the Paraguay River, & central Brazil.
describes
Weddell (figures?) there also.
W. Michelii Schleid
& W. Delilii Schleid.

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ENNO SANDER & CO.,
PHARMACEUTISTS,
Cor. 4th & Walnut, under Southern Hotel,
Cor. 2d & Walnut, under Barnum's Hotel,
ST. LOUIS, MO.

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Wolffia Columbiana

31-6

Mean....	10.1	11.6	8.6	7.4	8.2	9.0	9.2	....	......

2.—*Monthly mean of Temperature, Fahrenheit.*

MARCH.

YEAR.	AT 6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.	9 P. M.	MEAN OF MONTH.
1861......................	37.1	41.1	48.2	51.6	47.6	43.4	44.8
1862......................	36.0	40.1	46.9	48.0	45.6	42.5	43.2
1863......................	36.7	40.9	47.5	49.5	46.1	42.3	43.6
1864......................	34.1	38.7	44.6	45.9	42.2	38.6	40.7
Mean......................	36.0	40.2	46.8	48.7	45.4	41.7	43.1

APRIL.

YEAR.	AT 6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.	9 P. M.	MEAN OF MONTH.
1861......................	49.6	56.5	62.7	65.1	59.8	55.1	58.1
1862......................	46.5	53.3	59.5	60.8	57.6	52.3	55.0
1863......................	47.3	55.7	62.9	64.4	60.0	54.4	57.4
1864......................	45.0	50.8	55.3	56.6	54.1	49.5	51.4
Mean......................	47.1	54.1	60.1	61.7	57.9	52.8	55.5

in the London In-
te , in reviewing Admiral Fitzroy's Weather Book, thus writes of Atmospheric Perturbations:

The earth's atmosphere is divisible into two portions, lower and upper—the *stable* and the *instable*. It is not meant that absolutely no motion or change takes place in the upper division, but all the phenomena of winds and storms occur in the lower one, as explained in a former number. Opinions differ as to the total height to which the atmosphere extends. Admiral Fitzroy supposes that "as air, from ten to twenty miles seems a probable total depth," while about seven miles seem to be the limit in which man can exist. We do not perceive precisely what the Admiral means by the phrase "as air," but he may agree with the opinion of Quetelet, that the composition of the atmosphere may not be the same at great elevations, where the pressure becomes infinitesimal. However this may be, we do not coincide with his view that the total height is less than is usually supposed, but prefer the opposite supposition of the distinguished Belgian philosopher. Still, so far as relates to weather prognostications, our researches must be chiefly devoted to what takes place within a few thousand yards of the earth's surface; and if the loftier regions—in which miles of elastic matter in the gaseous form contribute next to nothing to the total weight of the atmosphere, as shown by the barometric tube—should ultimately be found to exert a noticeable influence upon the perturbations of the lower layers, it will probably be on account of the magnetic disturbances of which Quetelet conceives them to be the scene. The instable portion of the atmosphere is much lower in winter than in summer; but even when its volume, and consequent height, is enlarged by the action of solar heat, it can not reach much above the highest mountain top. The chief cause of air currents or winds is undoubtedly

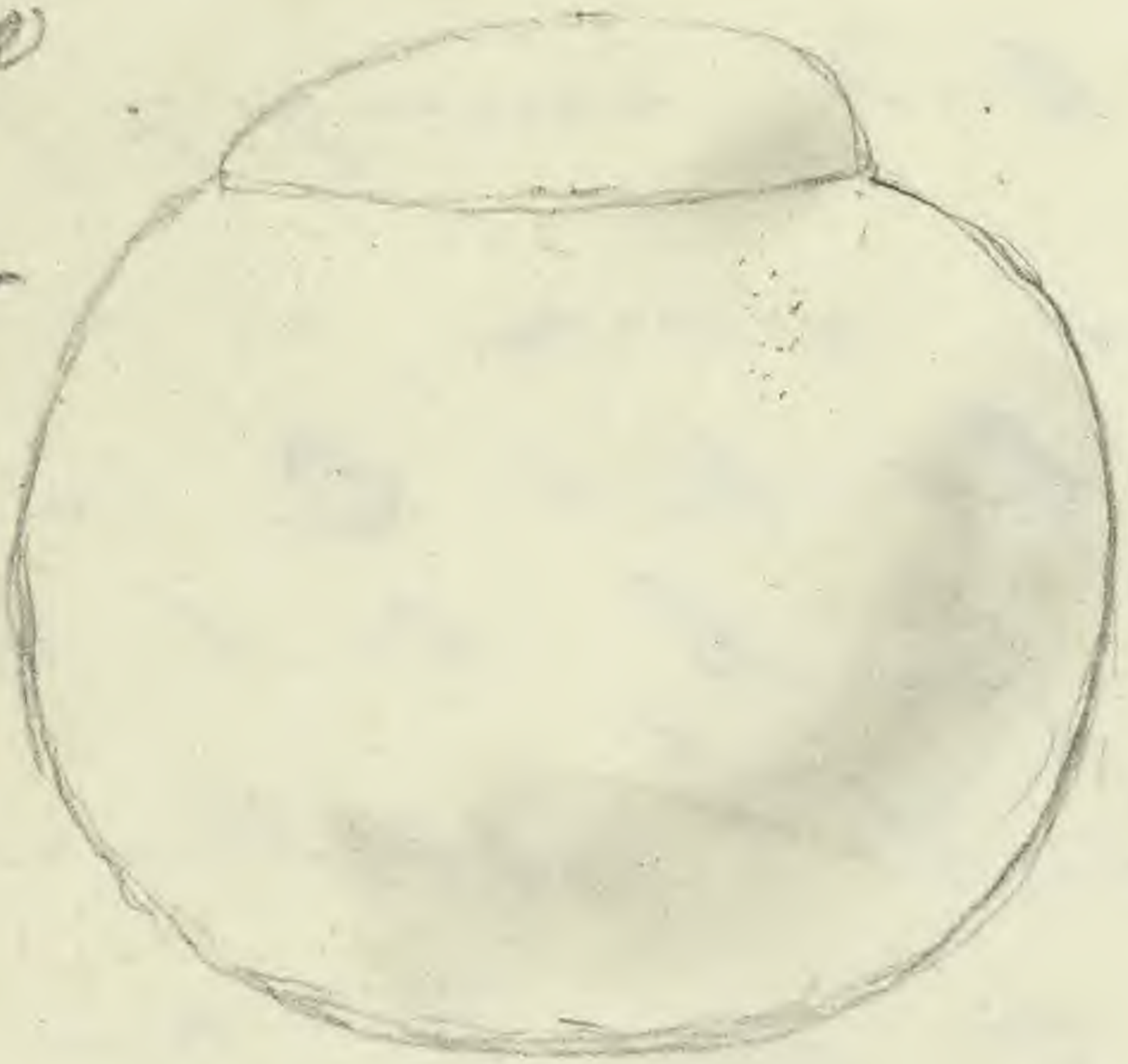
Wolffia Columb

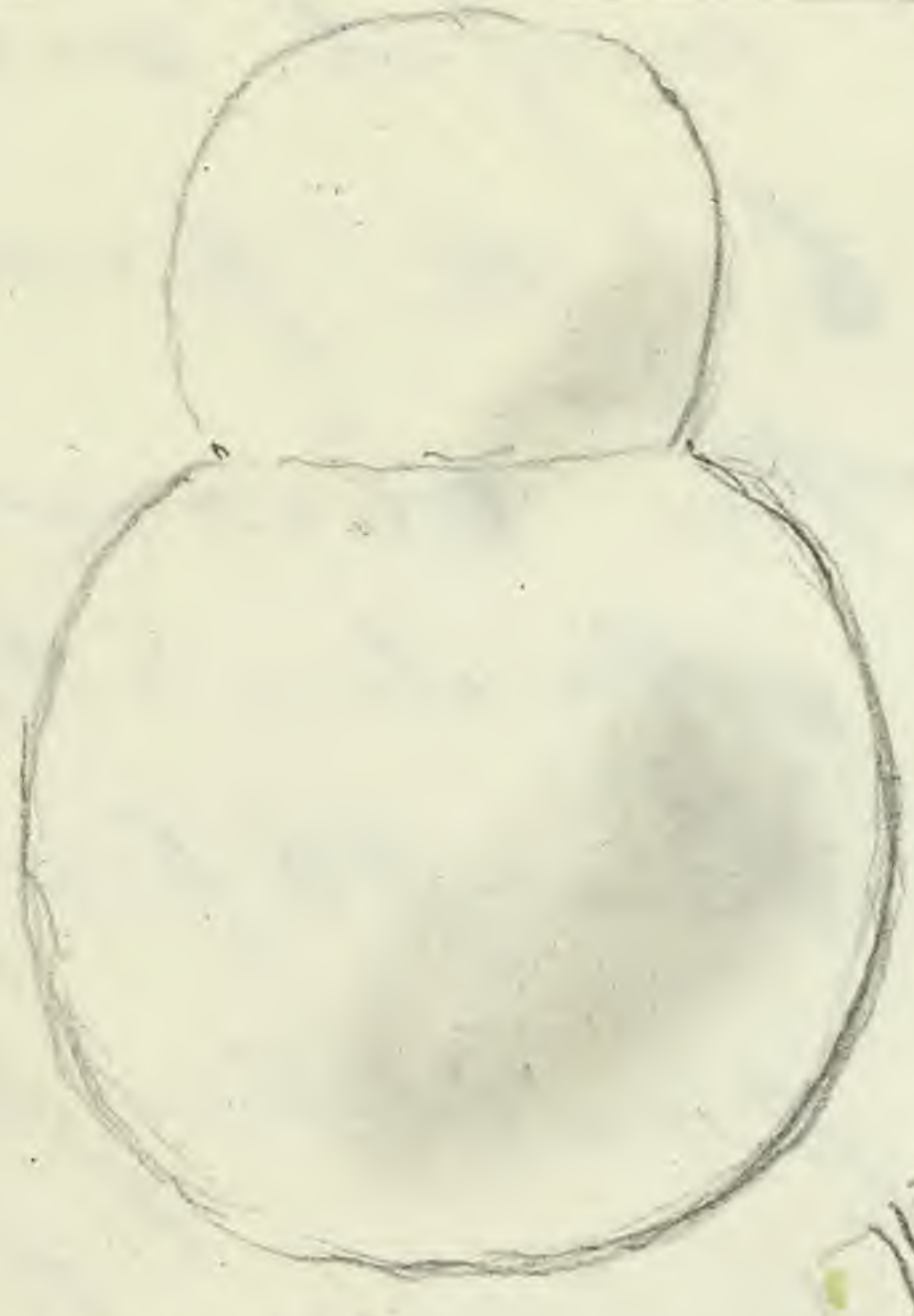
in pond at sawmills above Mound (old quarry)
with sawlogs — mixed with Lemna minor & polyrhiza

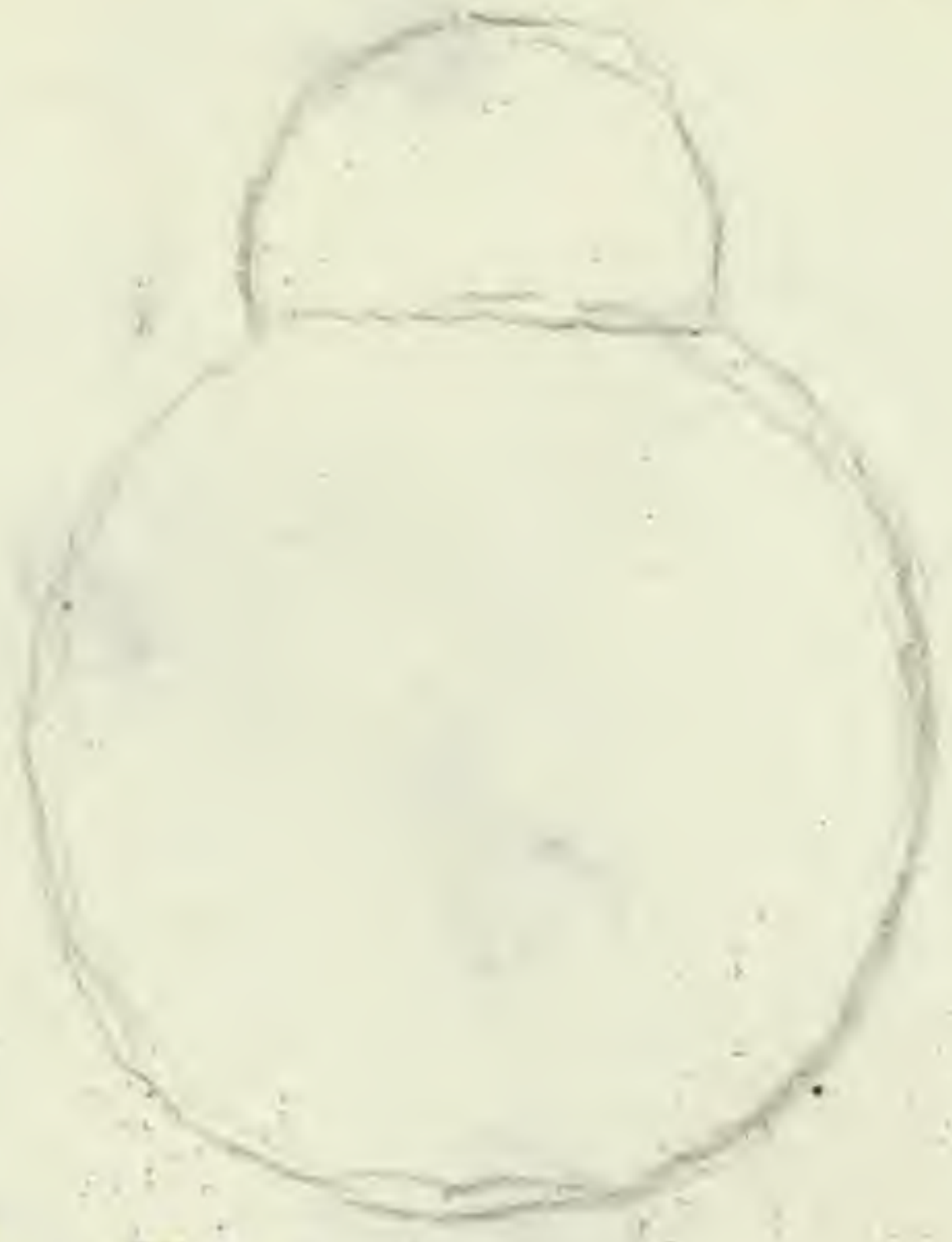
July 3 1867

X 30

globular



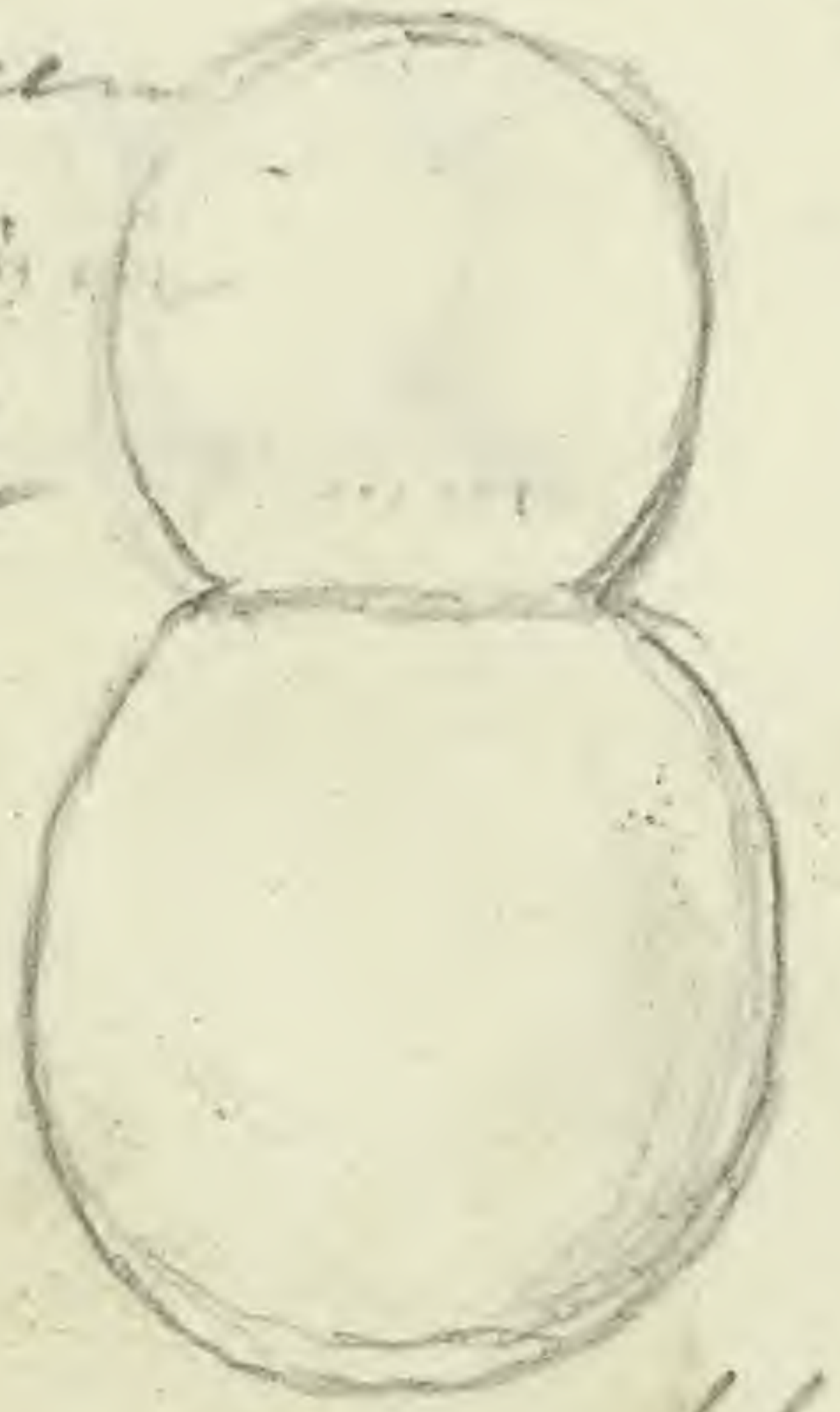




smallest seen

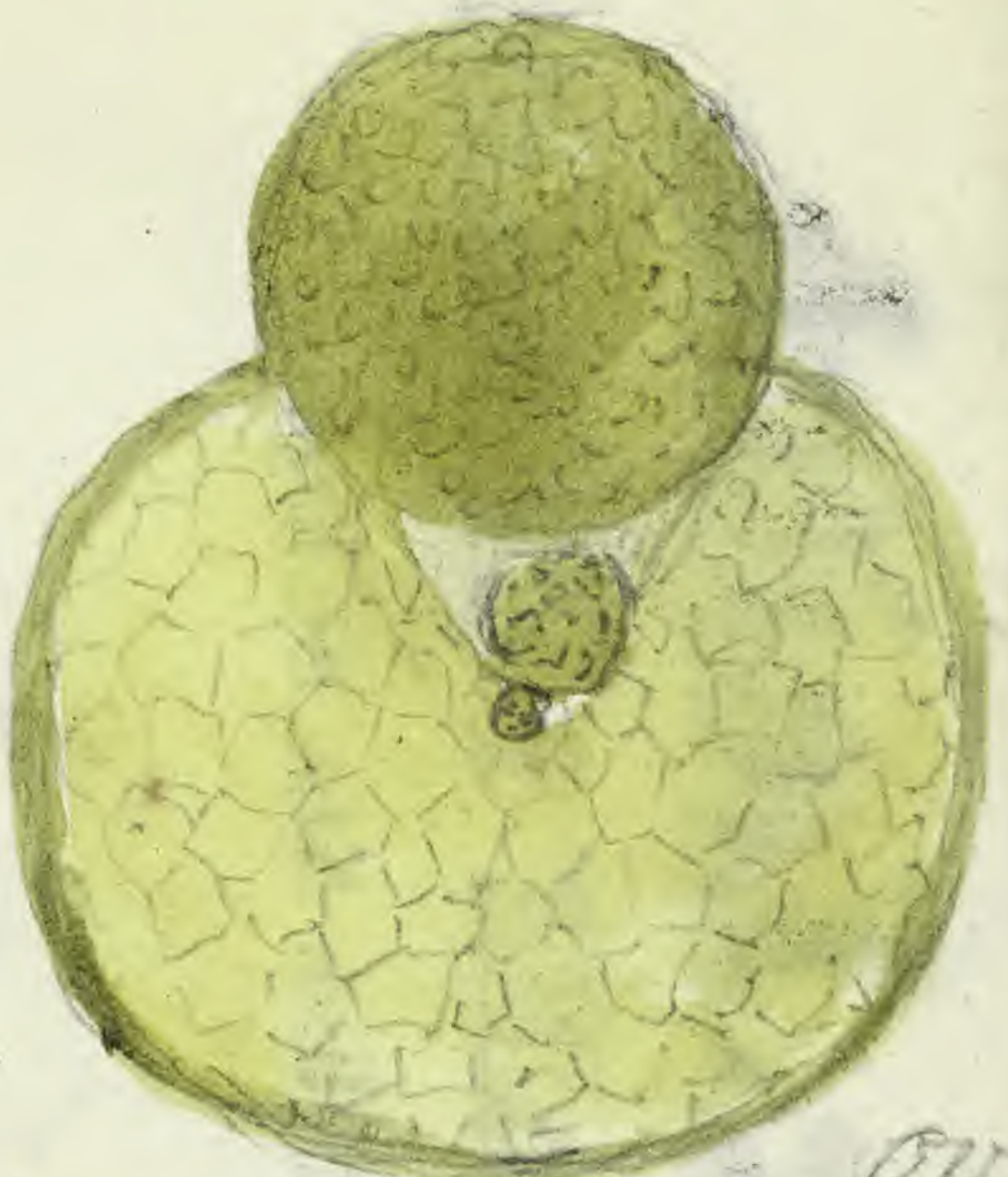
largest seen

usual size

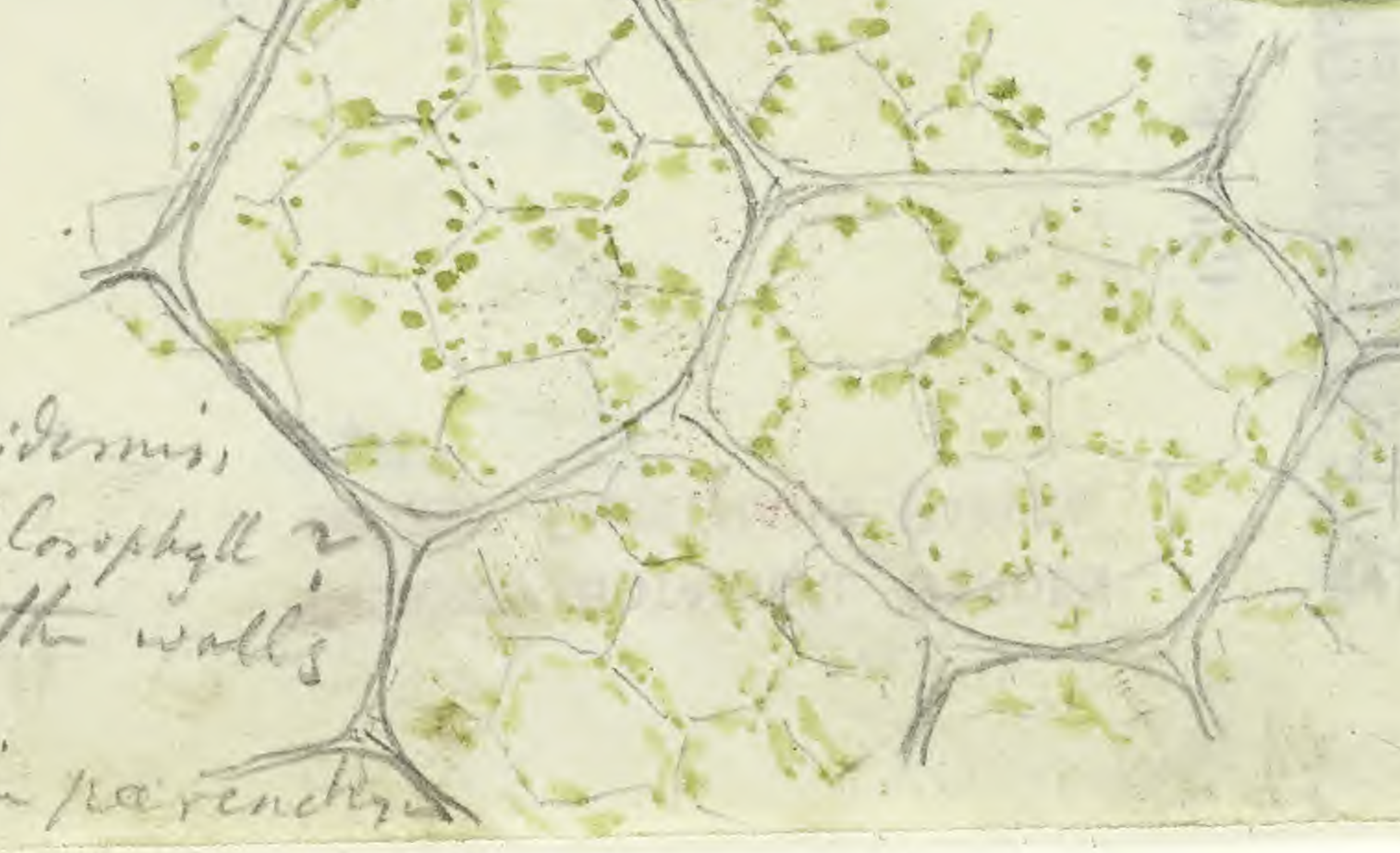


diamet 2/3 to 1 1/2 mm
usually about
1 mm

section



Over



only epidermis
with chlorophyll &
along the walls

no chlorophyll in parenchy.

parenchy- & epiderm cells X 280

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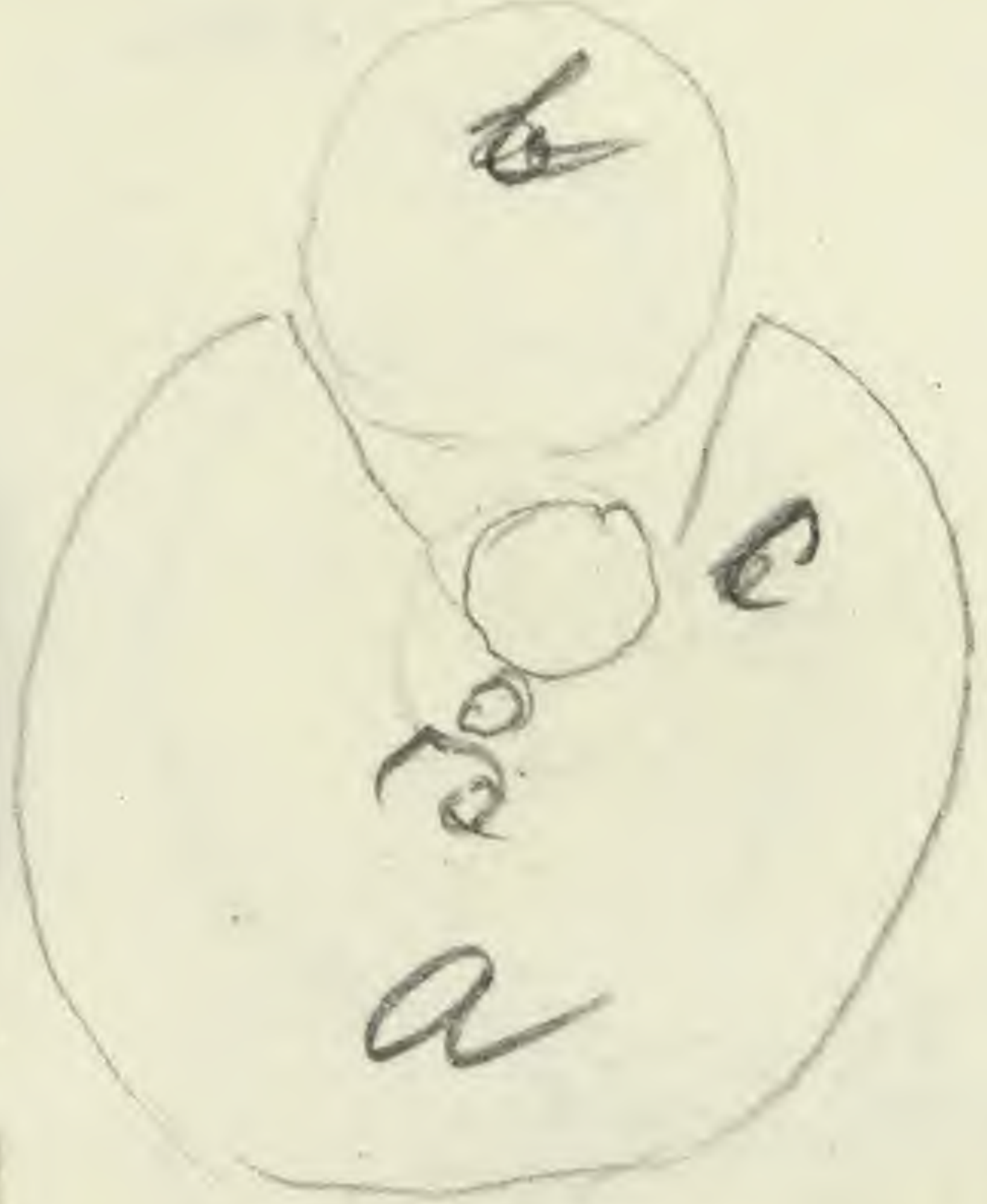


several careful sections show, that b, the first bud, emerging from the circular rima, is not attached to c that c is not the offspring of b, but of the parent plant; whether it belongs to c or to a, I have not seen, but there can not be a doubt but that it belongs to a also.

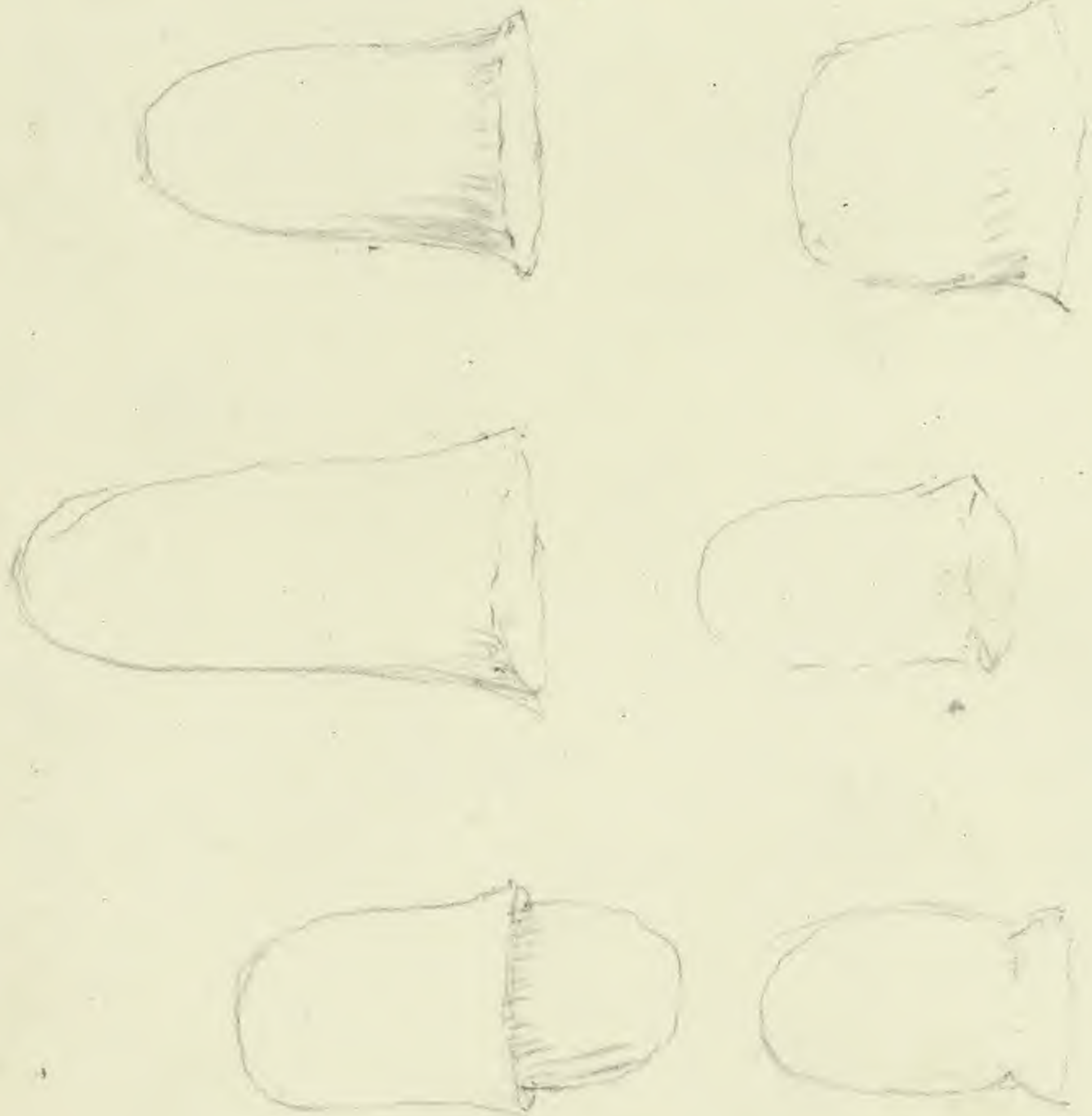
94.82

Wolffia Columbiana July 4 1867

~~Austin~~?, Payne?

poorly soaked - not good

soaked x 30



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0.018 0.025 0.028 7847

280 / 40 5 / 7143 . 7 / 1000 .. 8 / 1143

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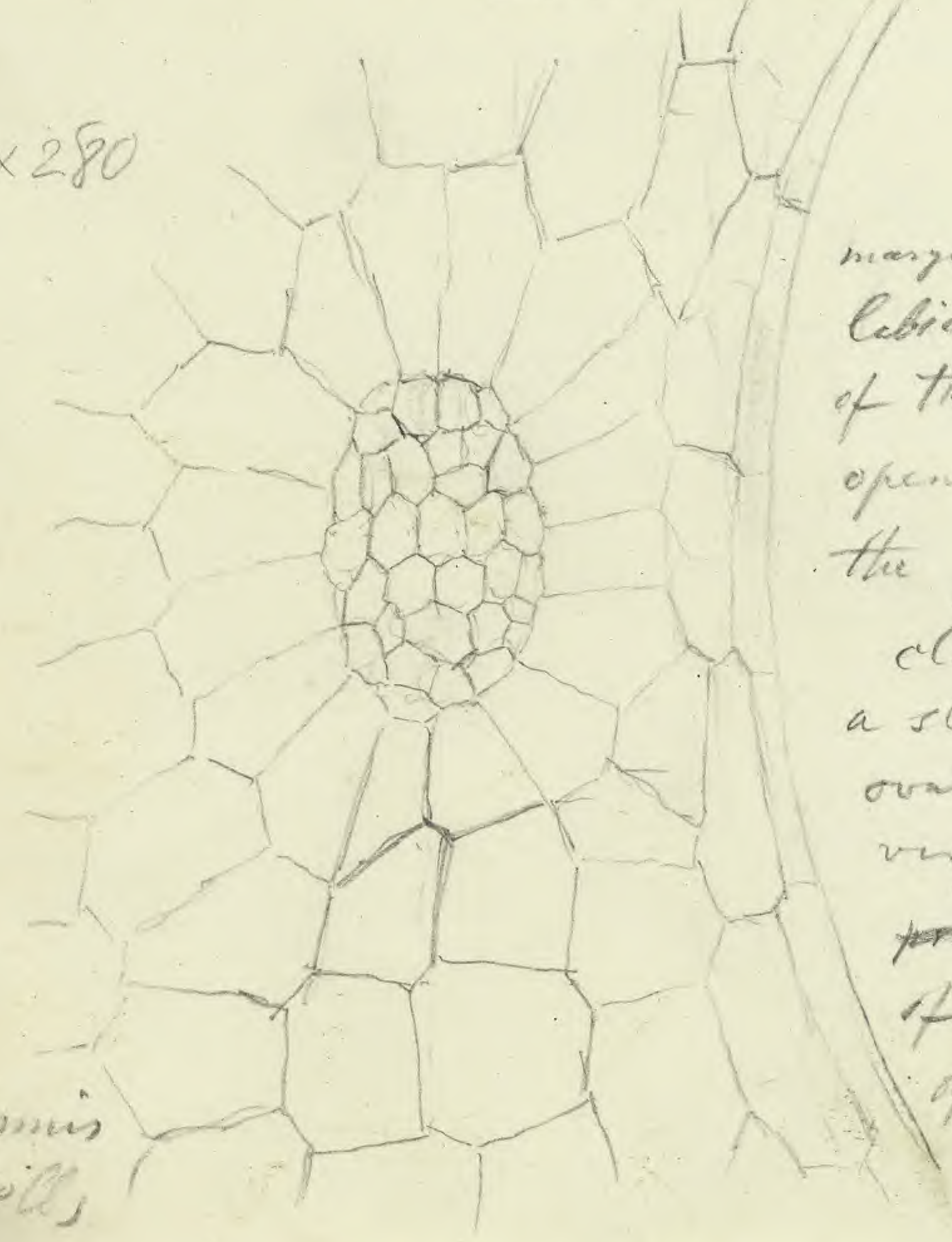
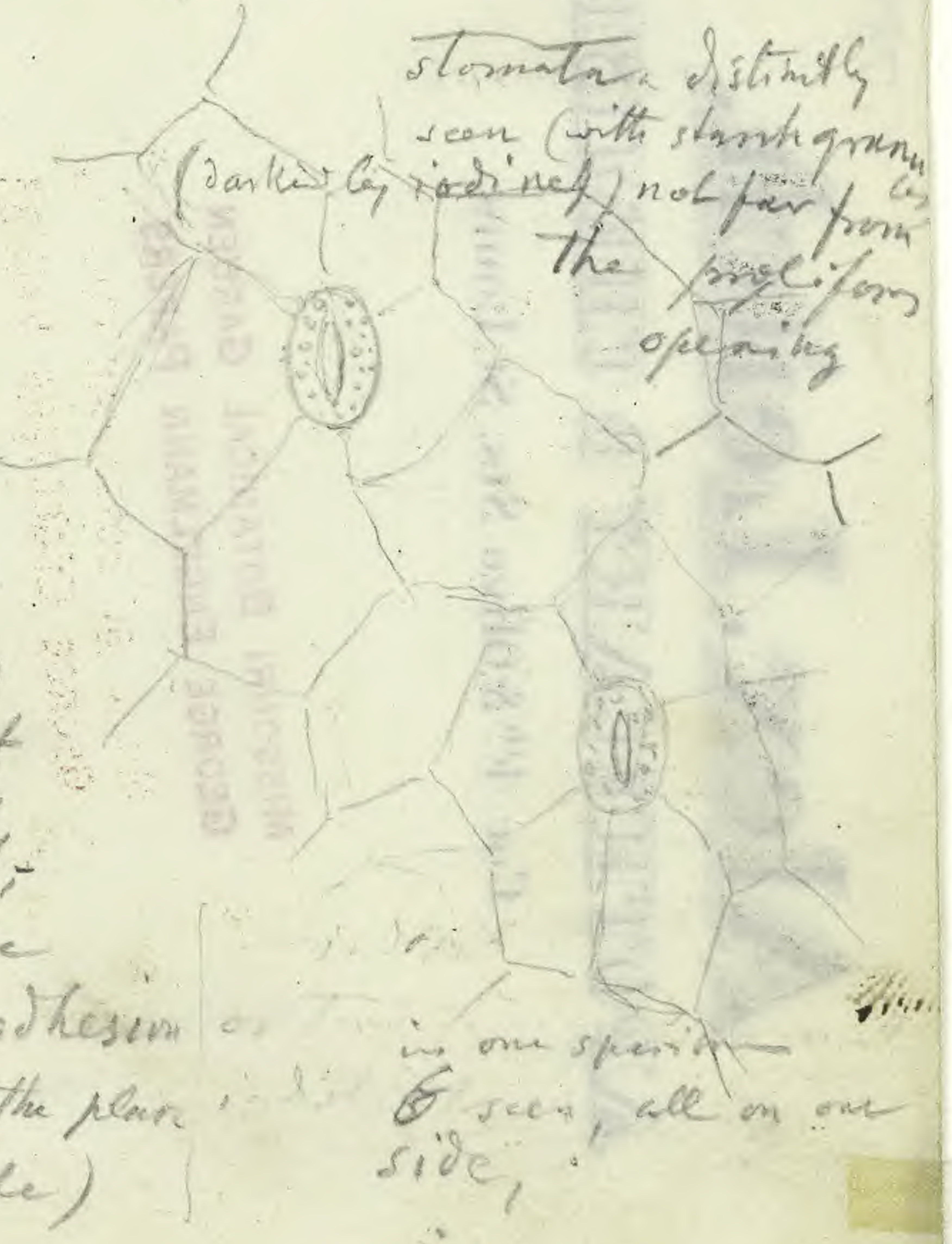
Cor. 4th & Olive Sts., St. Louis.

Wolffia ~~arrhiza~~ Columb. St Louis July 5 1867

decolorized by ether



margin or labium of the circular opening for the proles; close to it a slightly elevated oval spot with very small cells, ~~probably~~ the place of the original adhesion of the proles (the place of the peduncle)



stomata distinctly seen (with starch granules (darkened by iodine)) not far from the proliferous opening

in one specimen 6 seen, all on one side,

7848

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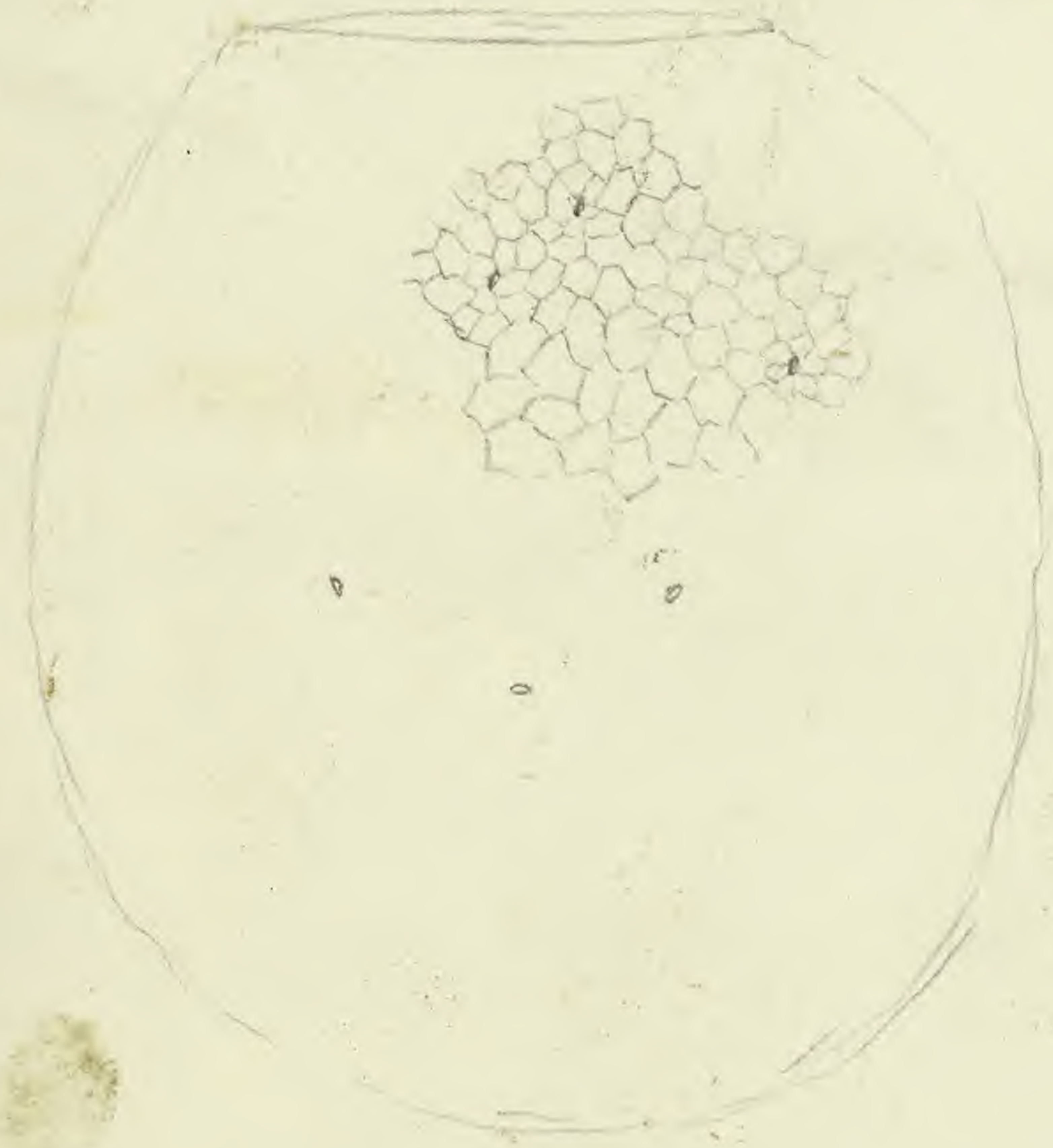
Wolffia ~~arrhiza~~ Columb. July 5 1867

St Louis



position of
the 6 stomata
discovered with
Iodine after
decolorization with
ether — all on
the same side —
none on the other

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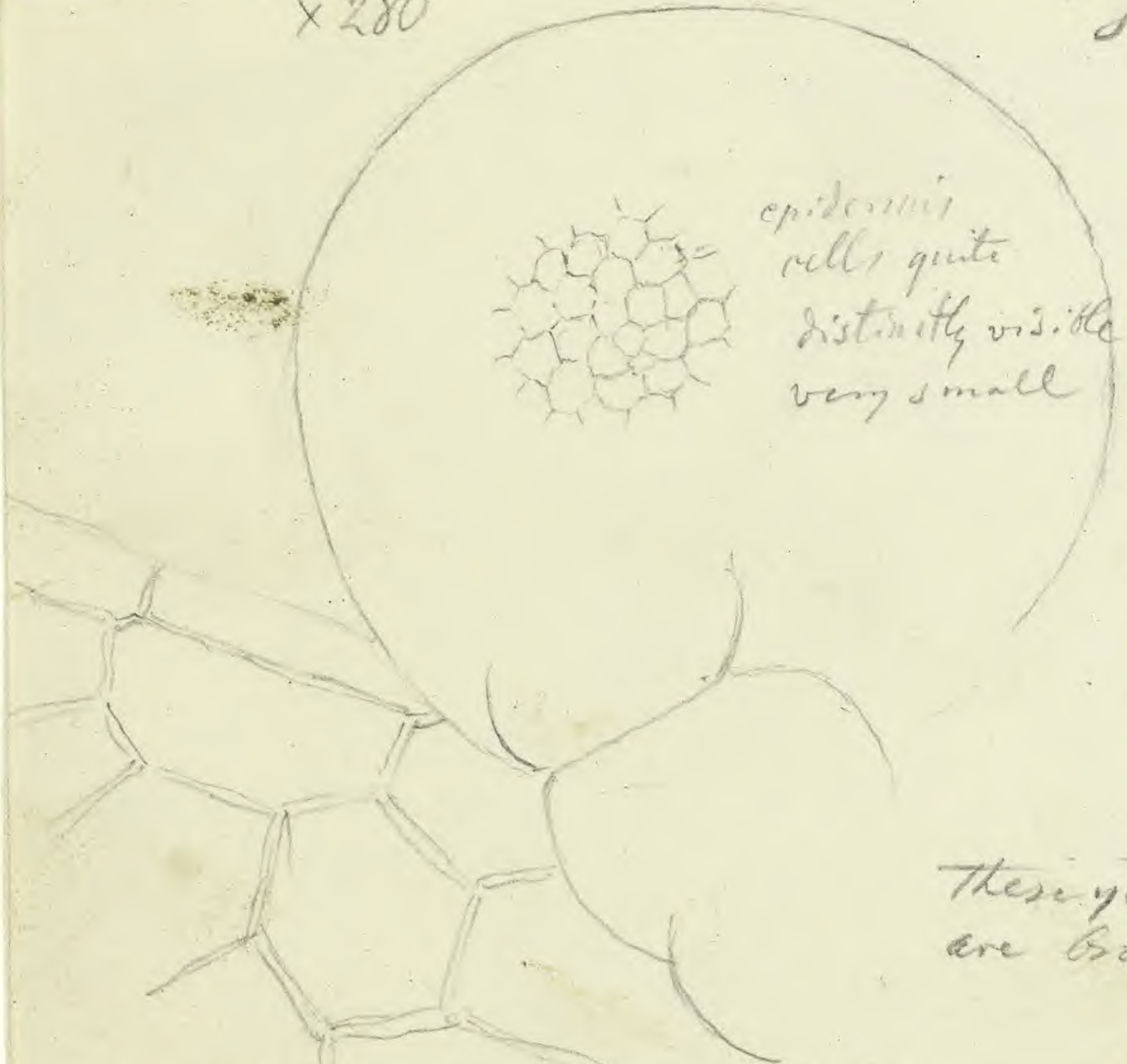
Wolffia ~~arrhiza~~ Columbia July 5 1867

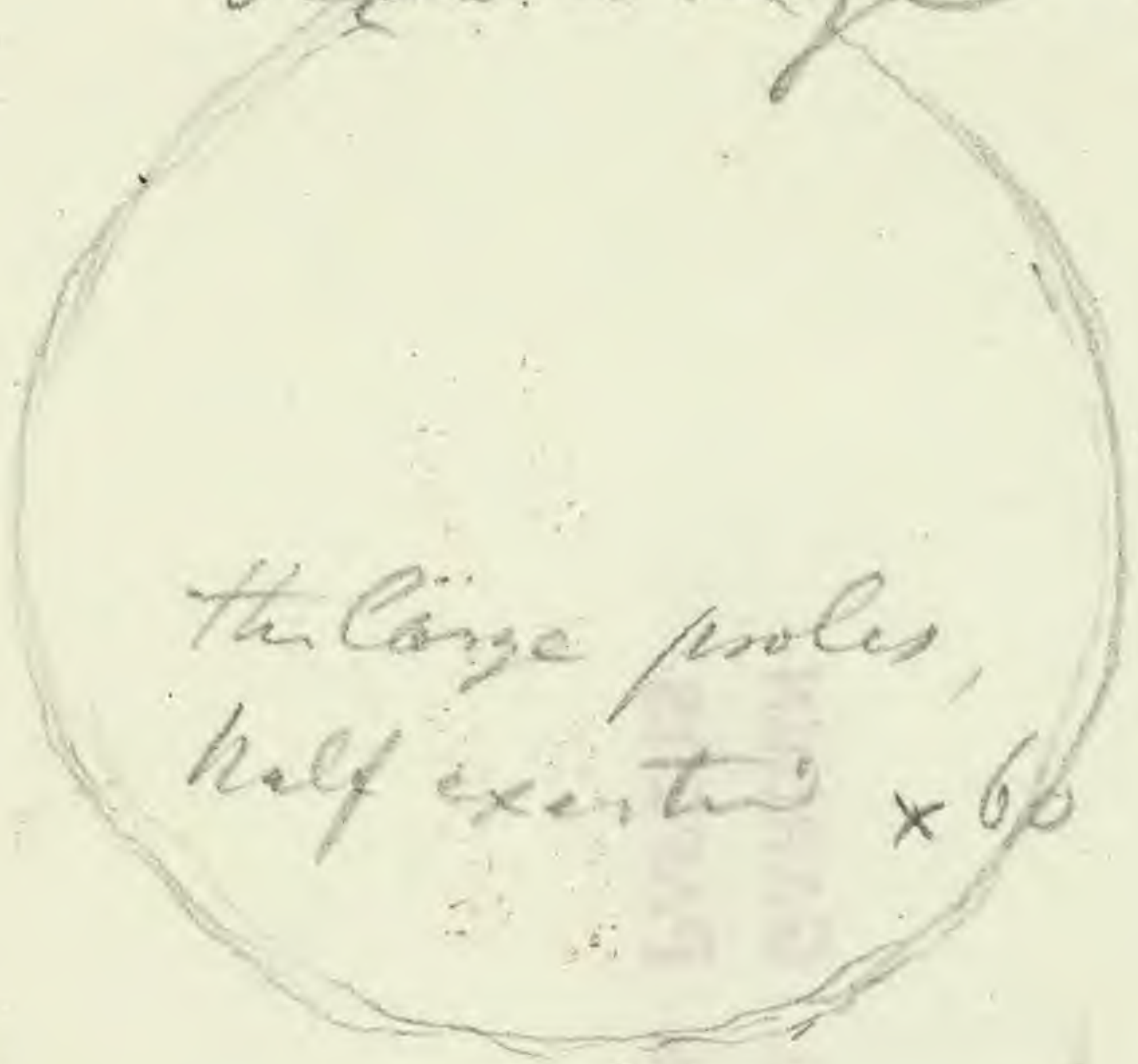
St Louis

×280

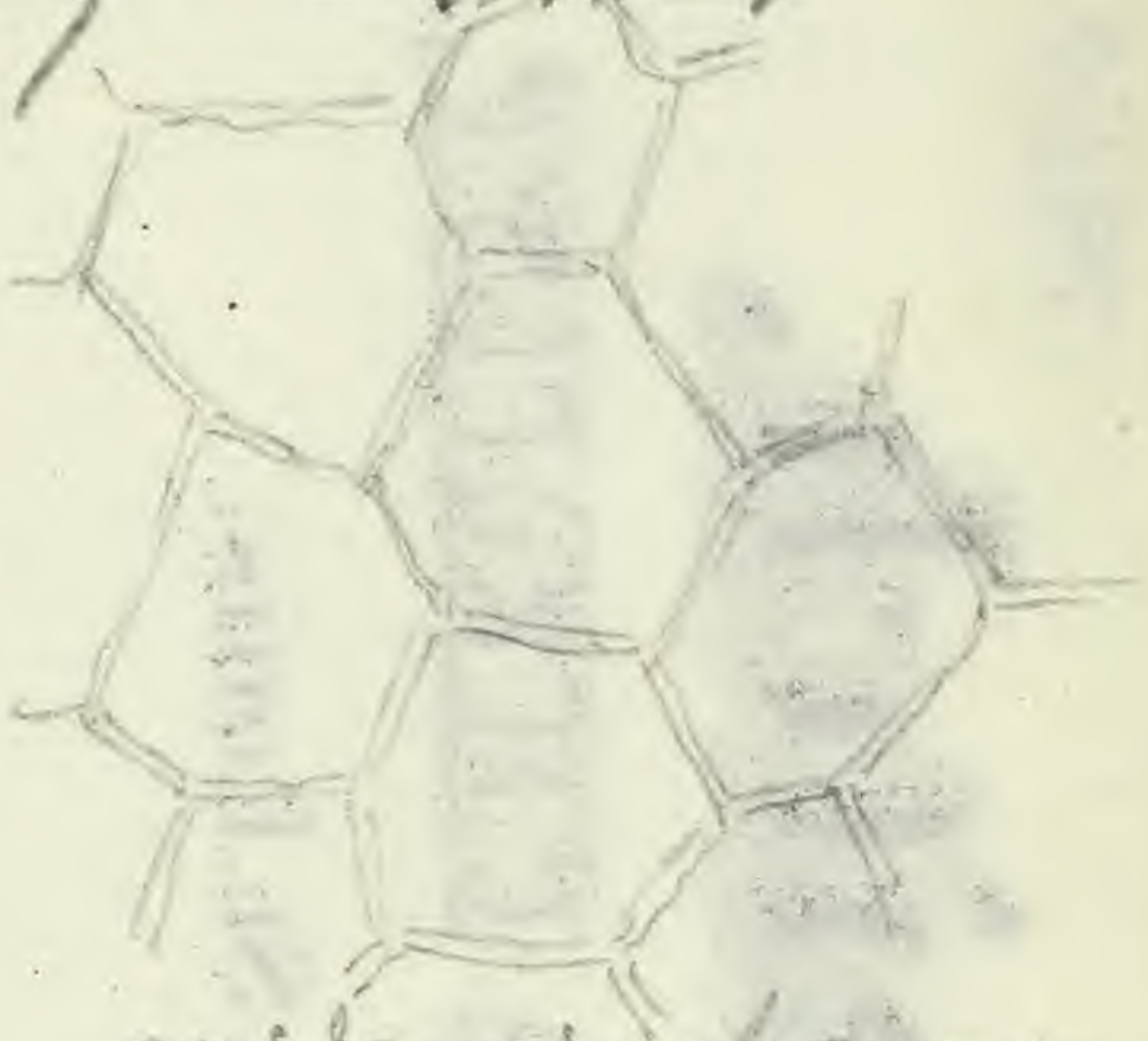


epidermis cells quite distinctly visible very small

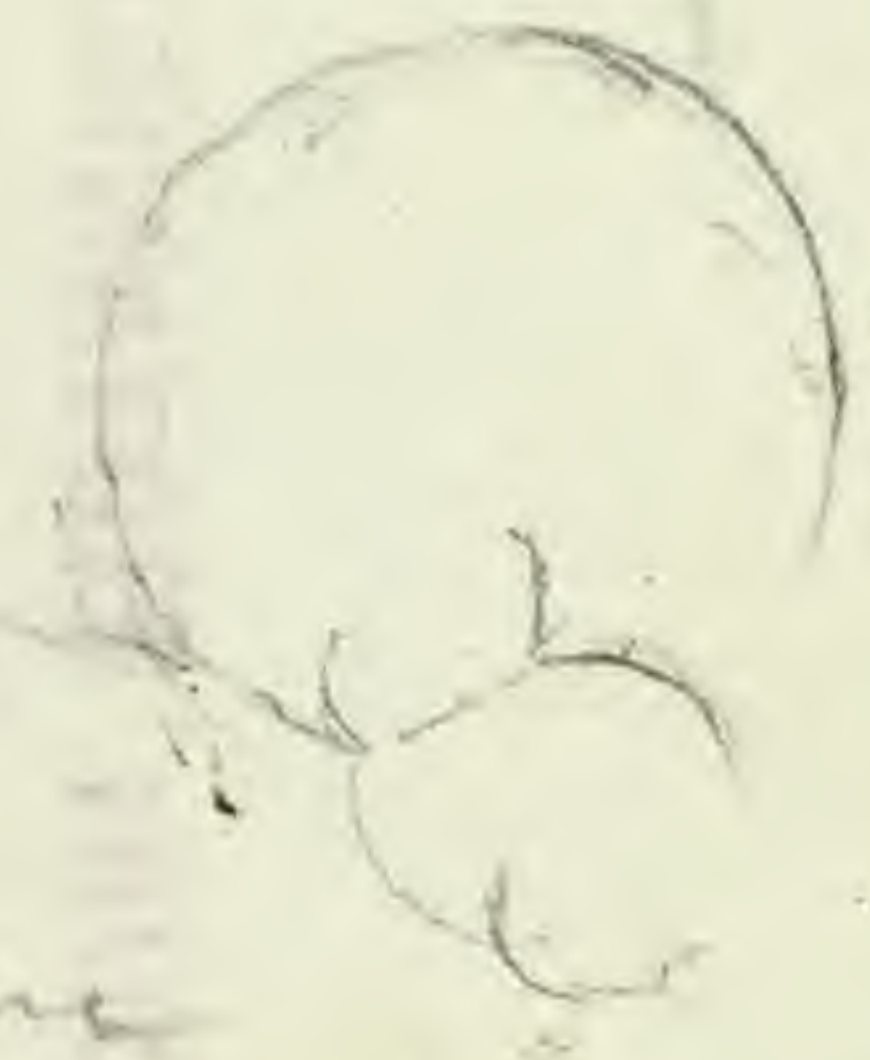
decolorized by ether



the large proles, half exserted ×60



epidermis of same ×280 cells smaller than in parent.



these young buds are browned by iodine - - the same ×60

smaller germs in the base of the funnelshaped opening somewhat pressed under glass

7850

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Cor. 4th & Olive Sts., St. Louis.

0 1 2 3 4 5 6 7 8 9 10
cm
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MISSOURI
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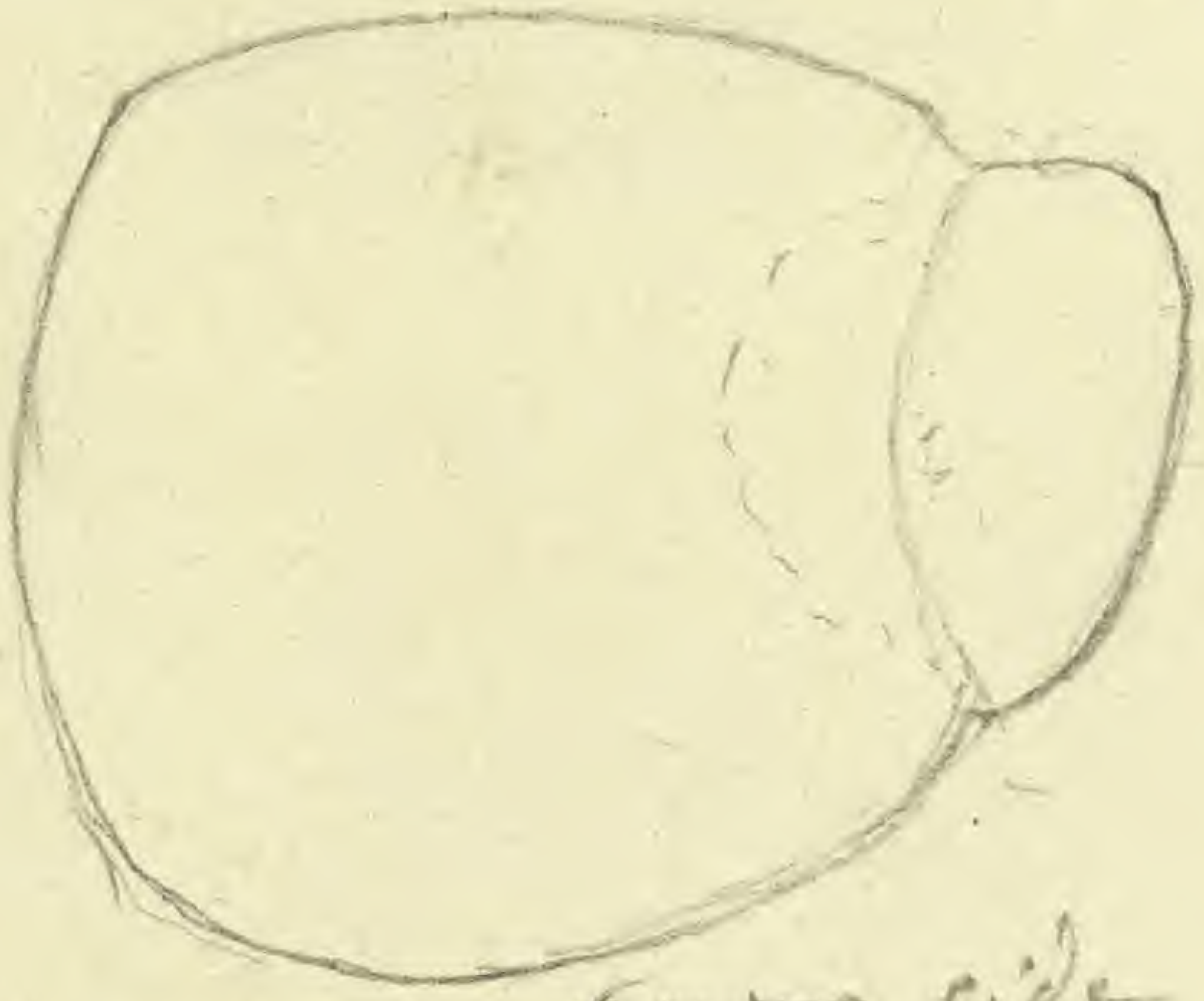
Wolffia ~~arrhiza~~ Columbiana Aug 9 1867
old quarry near Mound, St Louis

x 30

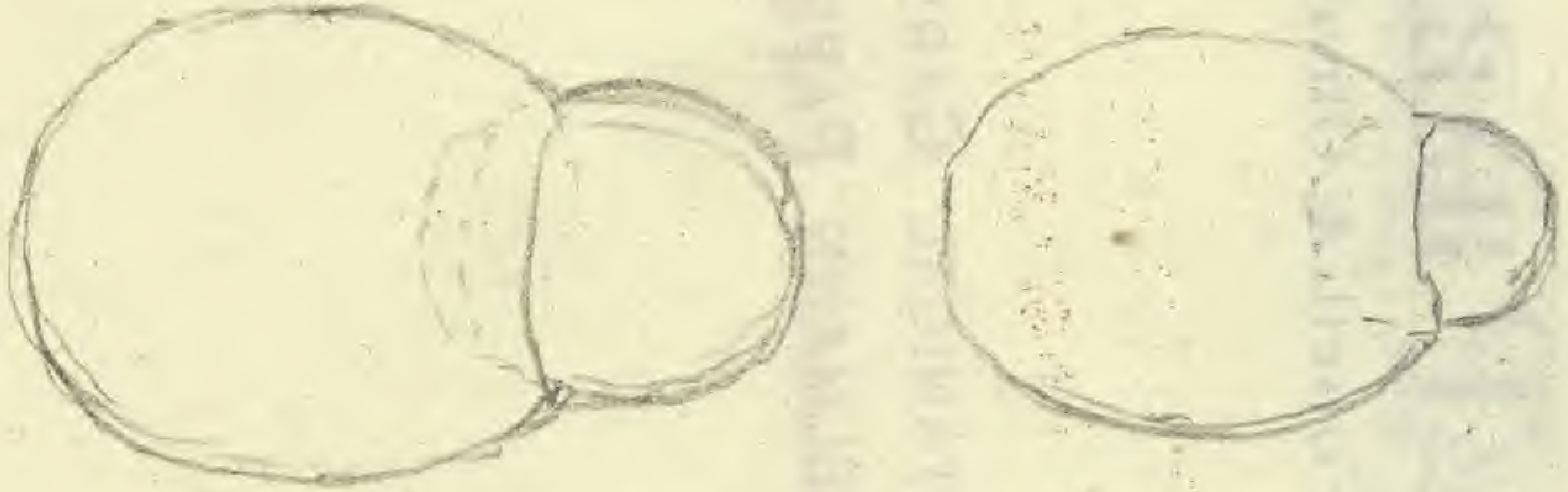
extreme sizes proliferous individuals from 0.6 to 1.0 mm. long

upper side



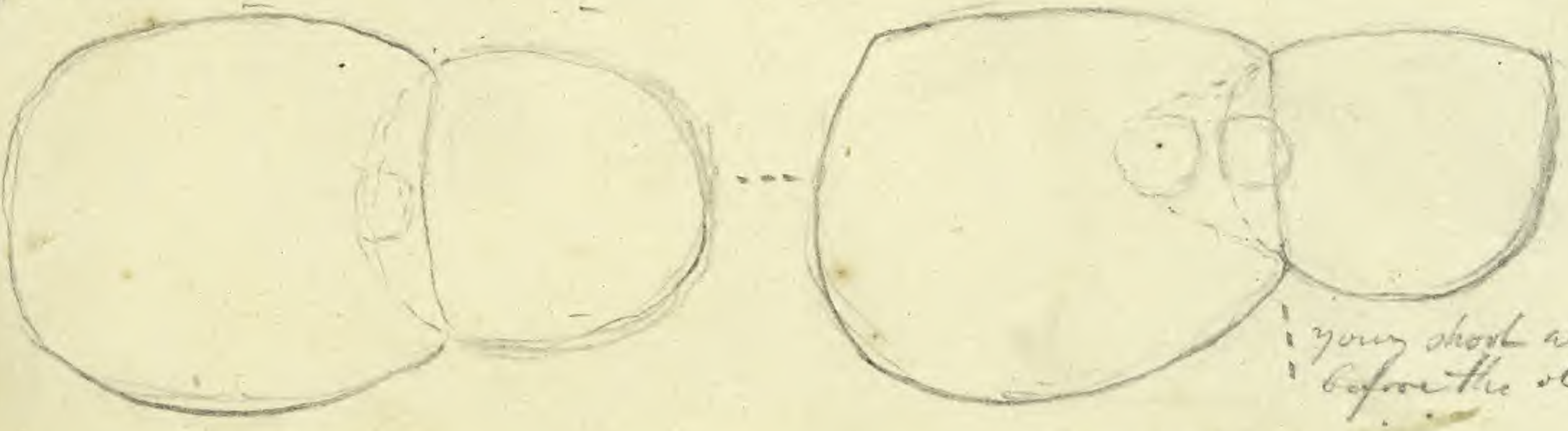
lower side

top view



top view

upper side



side view of same

young shoot already formed before the old one falls off

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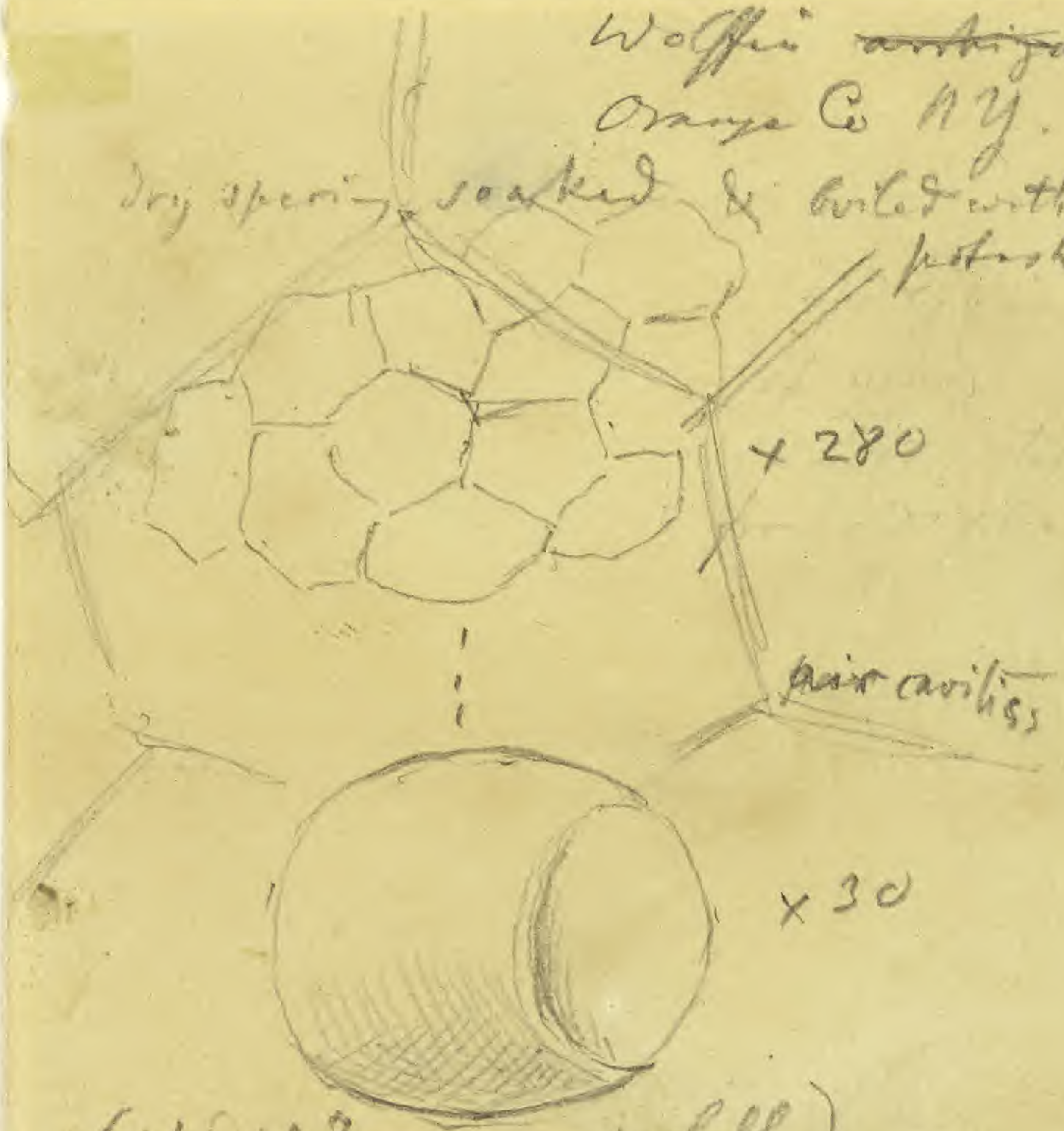
Wolffia ~~arrhiza~~ Columb

Aug 9 1867

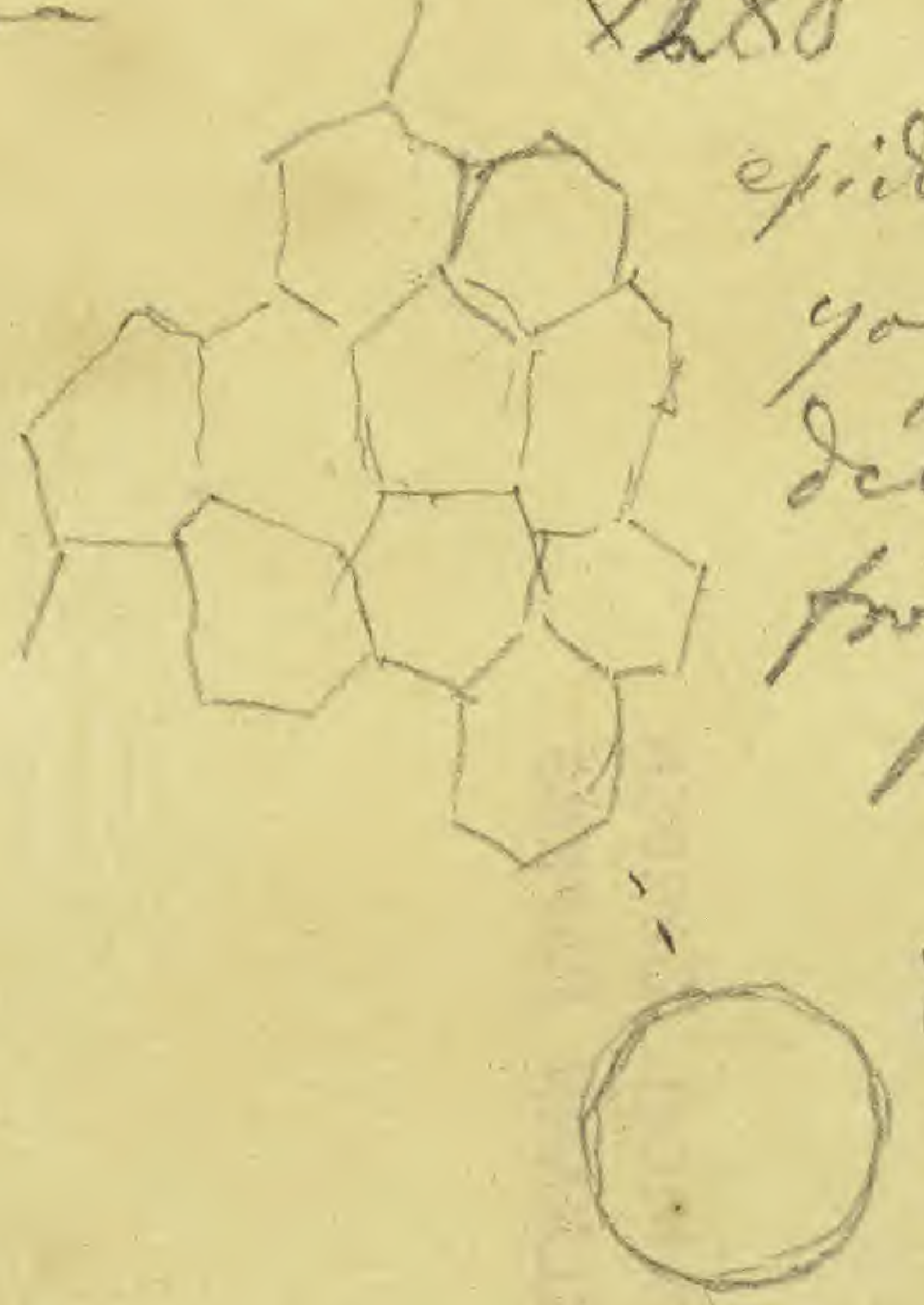
Orange Co N.Y. Aug. 1866 C. F. Austin

dry specimen soaked & boiled with some potash



(disc?? or more probably) globe — in view of the circular opening

x280



epidermis of young shoot detached from old plant

young shoot

disc or globe?

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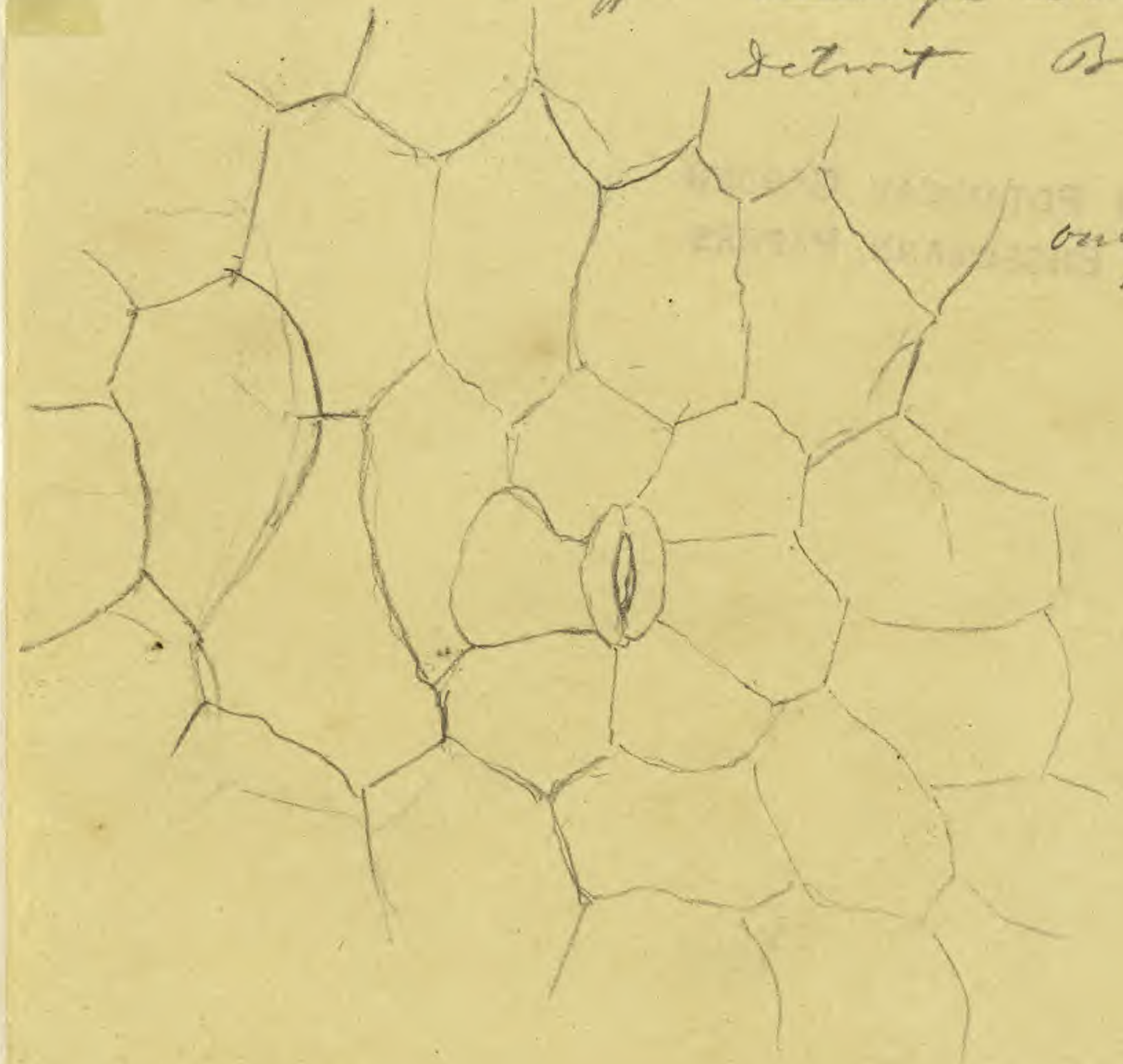
Wolffia arrhiza Columb Aug 23 1867
Detroit Bigelow



only 3 stomata seen

small cells of cicatrix where the shoot had been detached from the parent plant is on the lower side, near the opening

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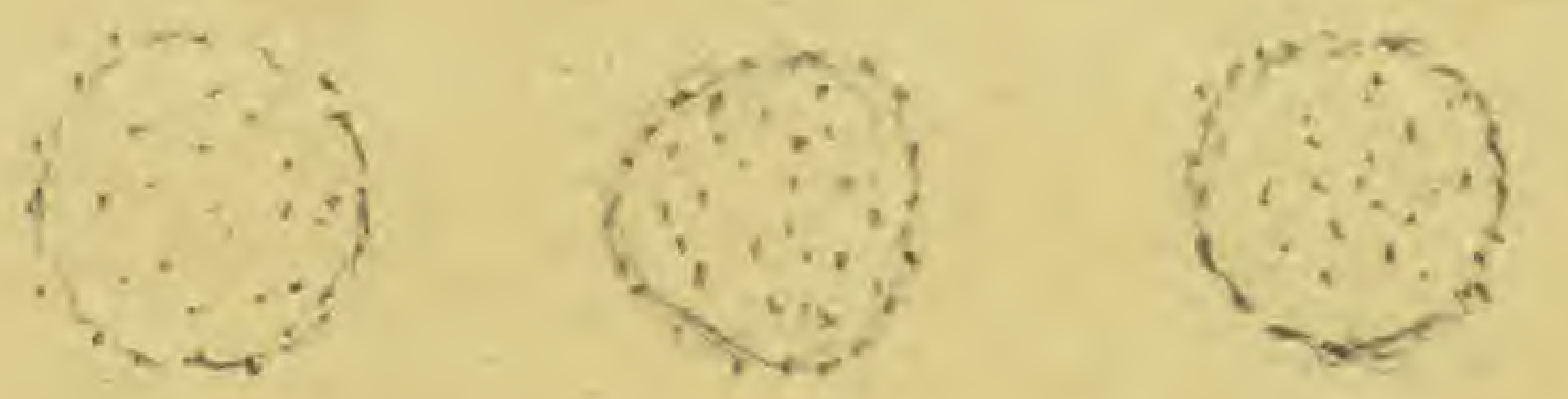
Sept 11 1867

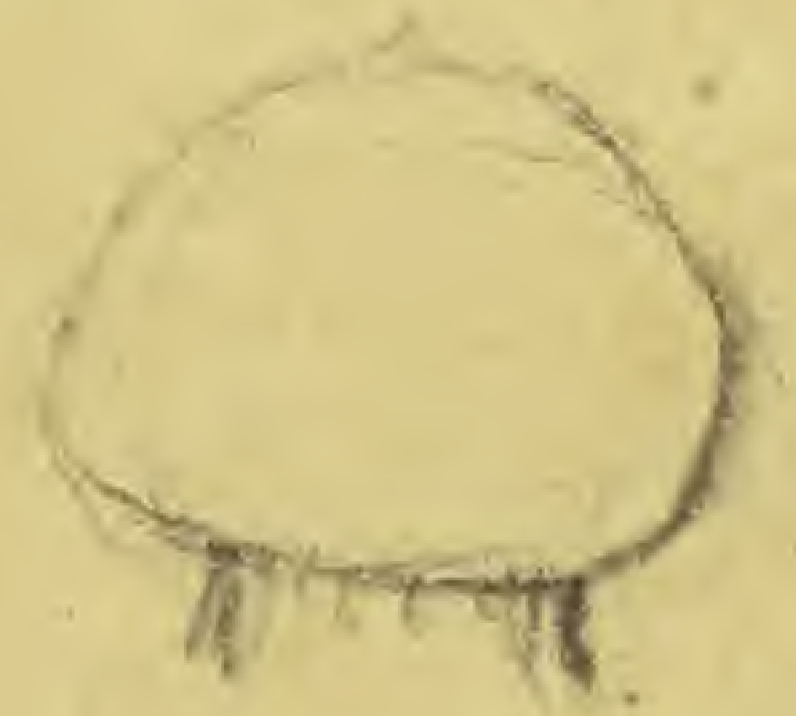
Wolffia Columbiana

Athens Ill. E. Hall Sept 1867



Pollengrains x 415

tuberculous all over 0,017 - 0,019 mm



anther x 60

seen as a dark body

of fungus like appearance

in 2 specimens of +.

No pistil seen. – Pollengrains very distinct.

Anther probably very young and pistil not yet developed

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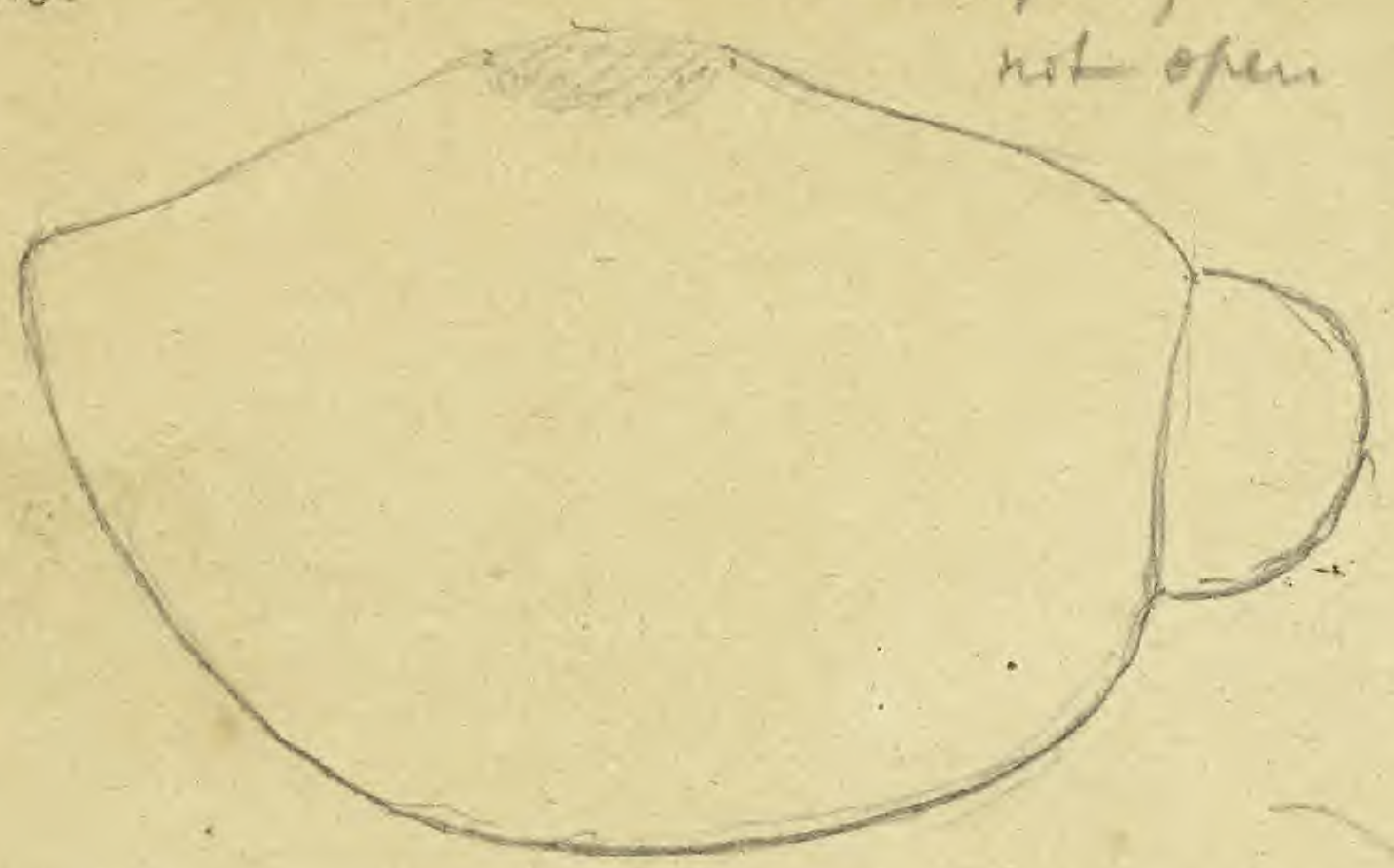
Wolffia columbiana

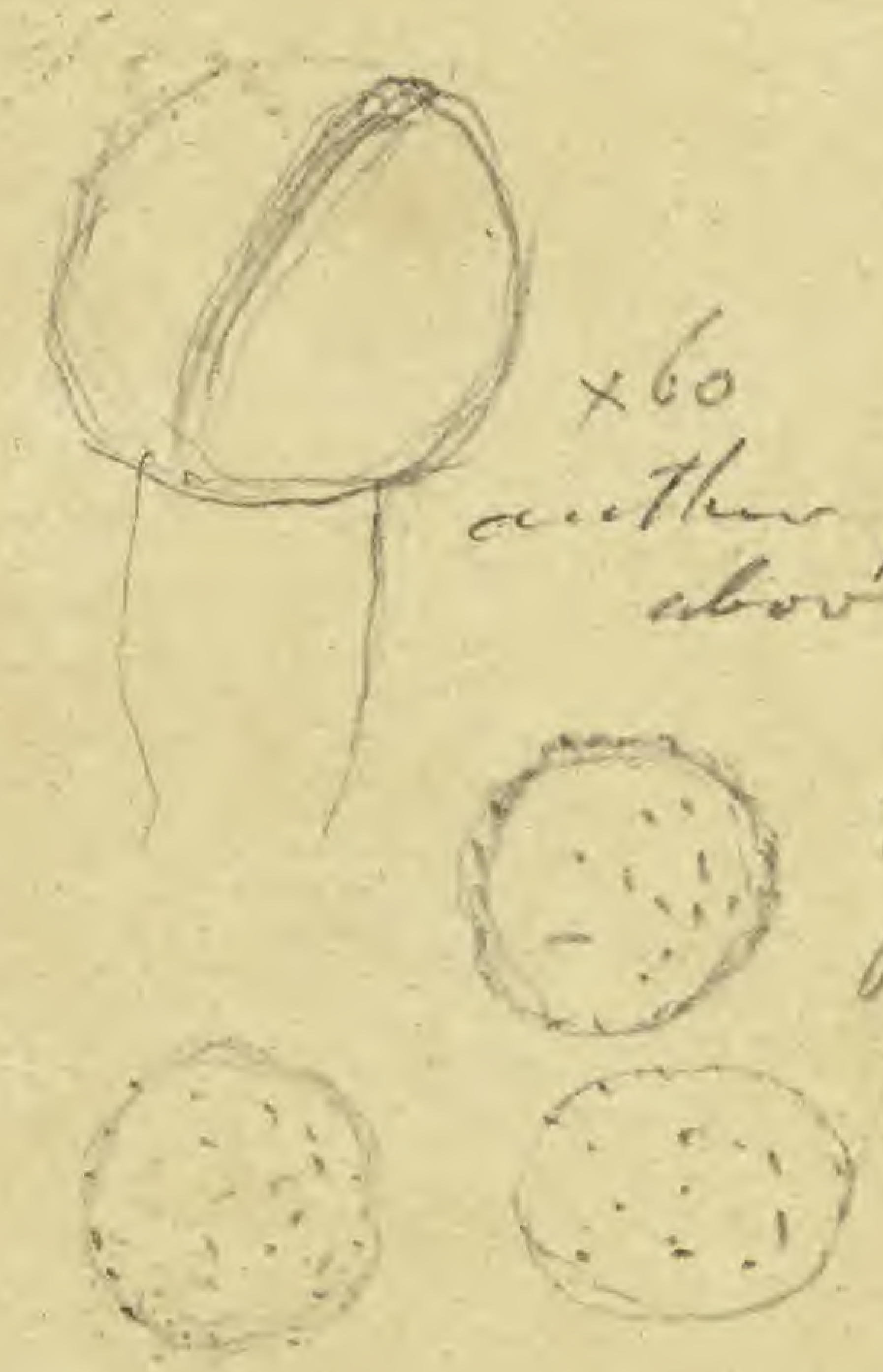
Sept 18 1867

Athens Ill, E Hall



x60

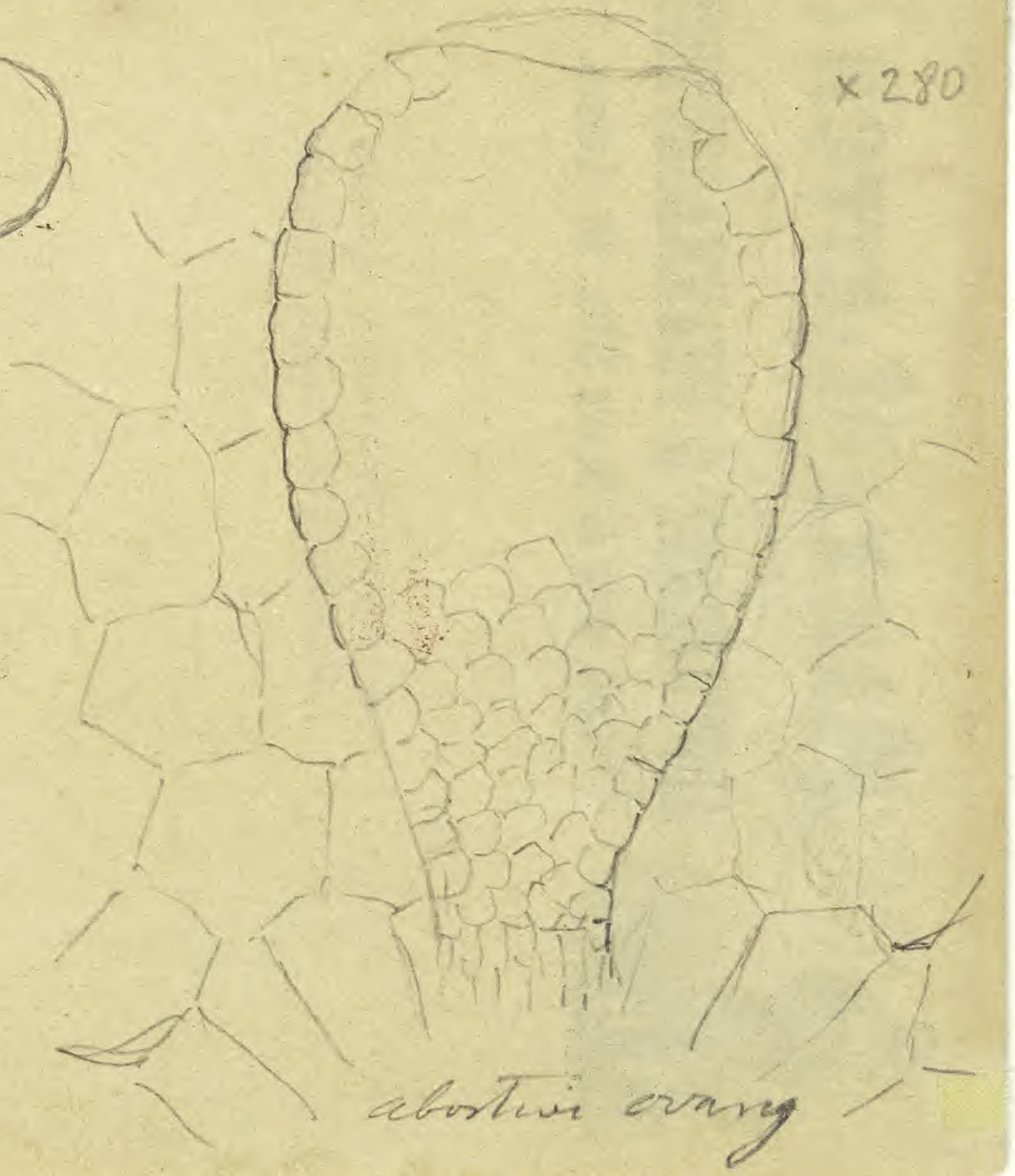
dark elevated spot, not open



x60 anther from the above specim

x415 Pollengrains of same

anther and ovary abortive filling cavity



x280

abortive ovary

7855

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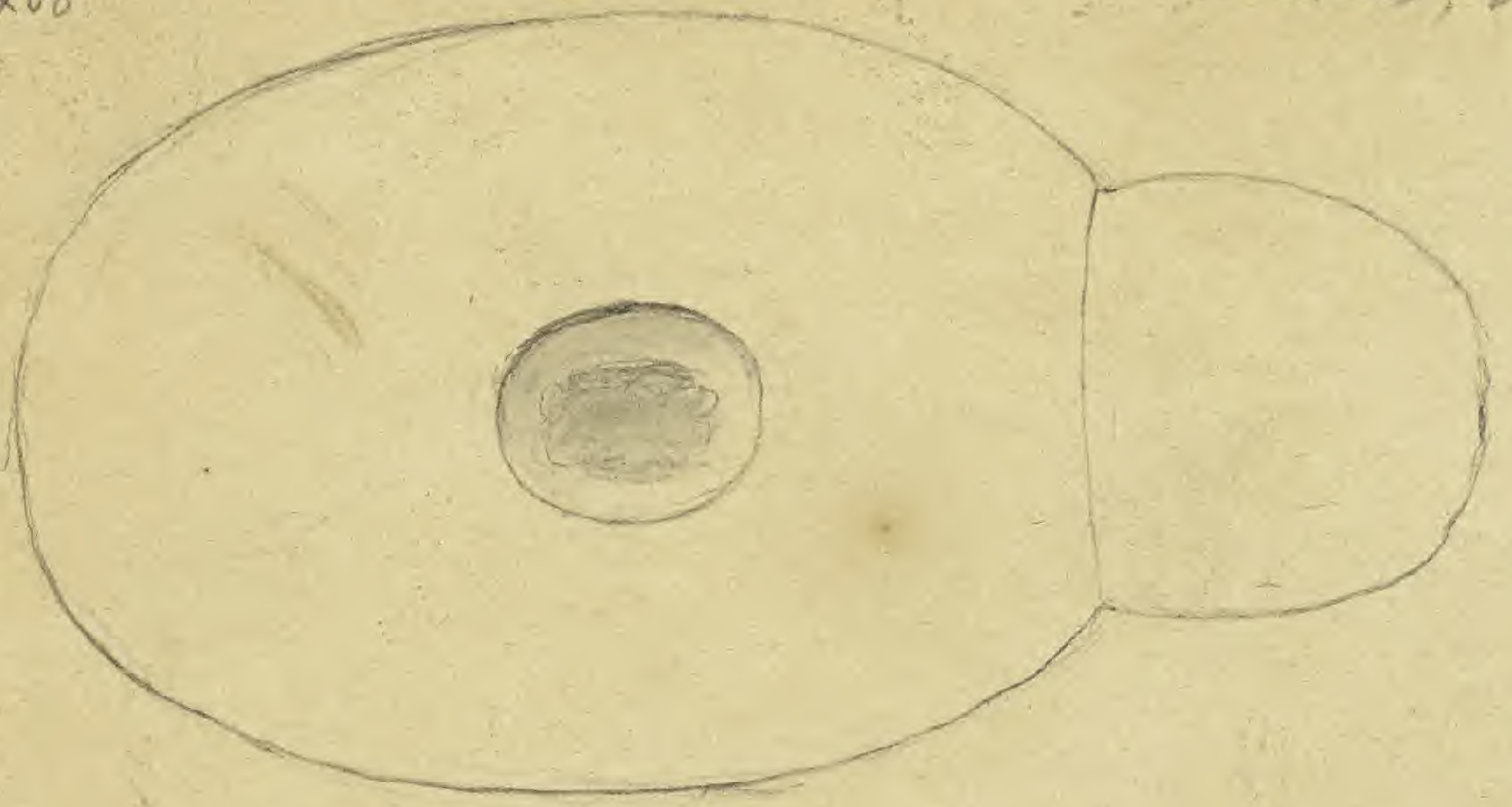
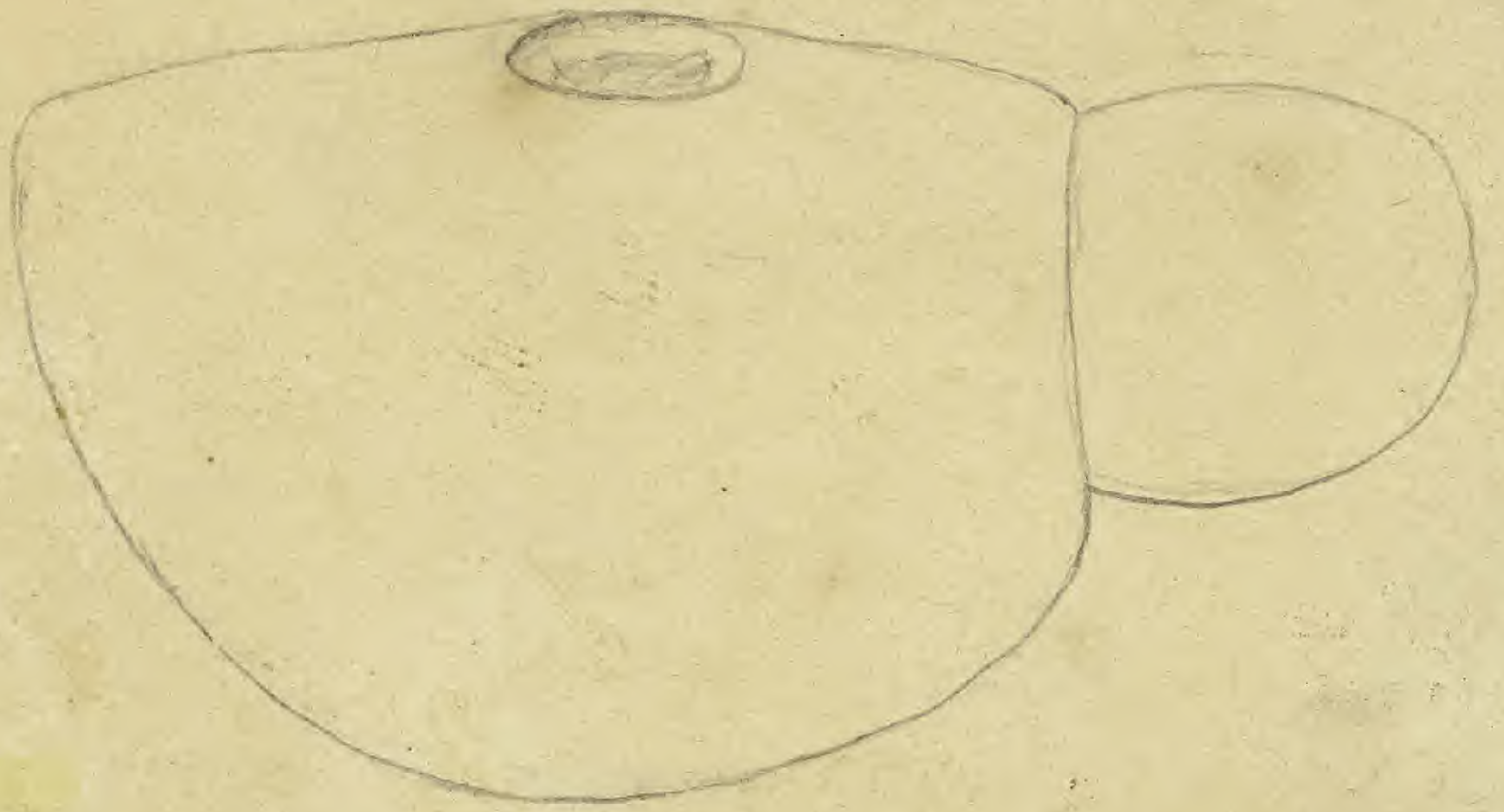
Wolffia Columbiana
Athens, Ill. E. Hall

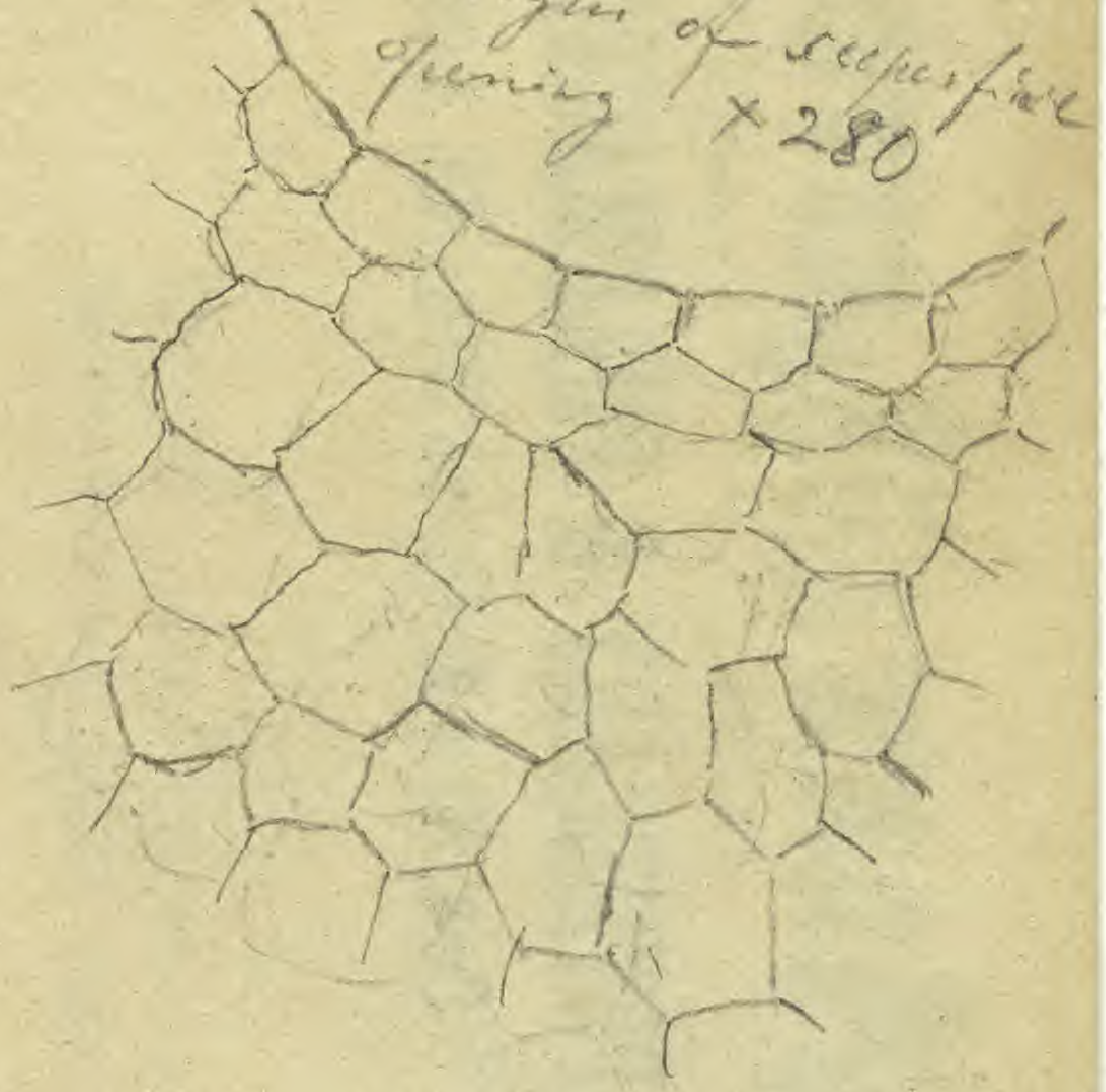
Sept 18 1867

x60





margin of superficial opening x280



anther x60 from typica

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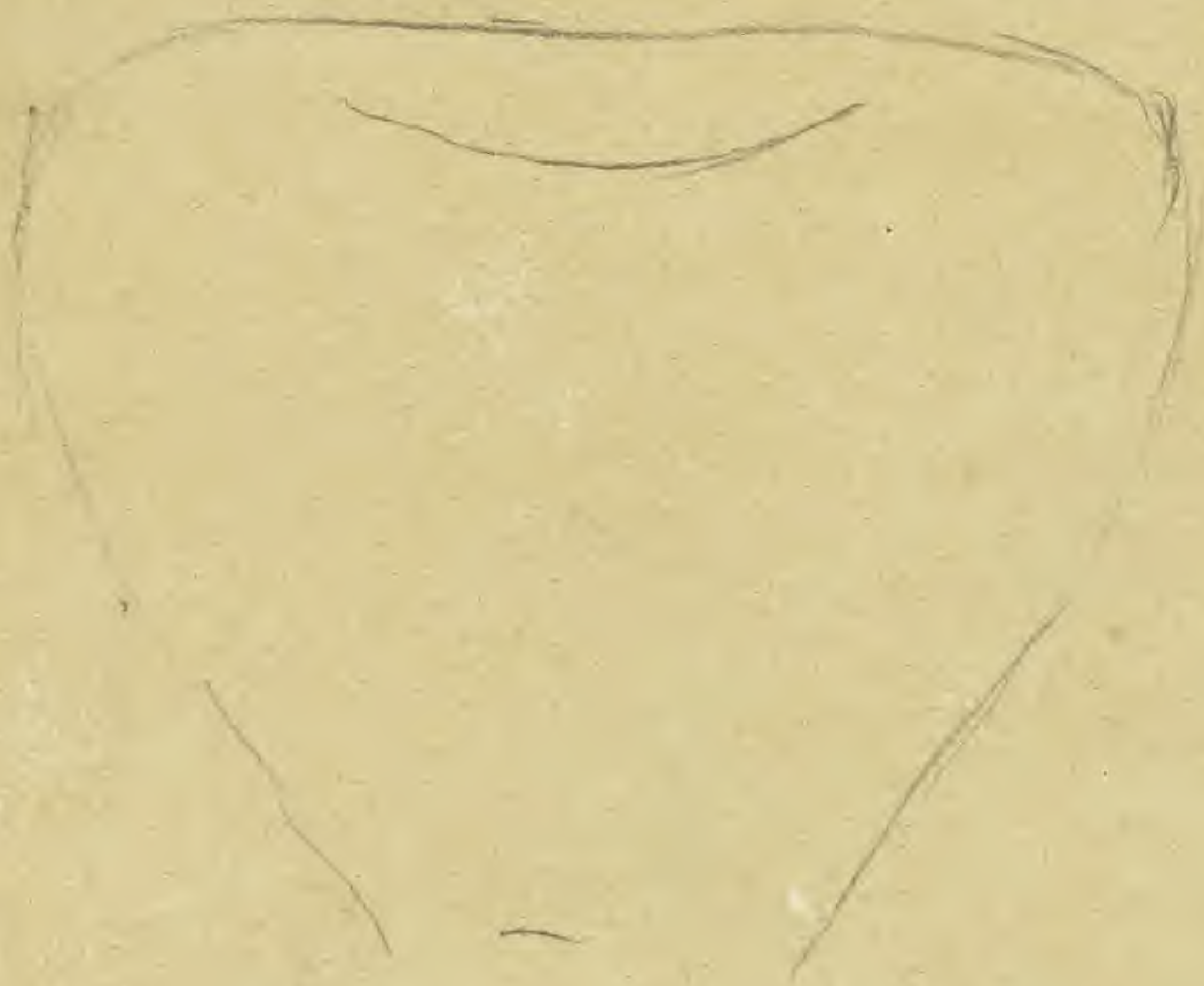
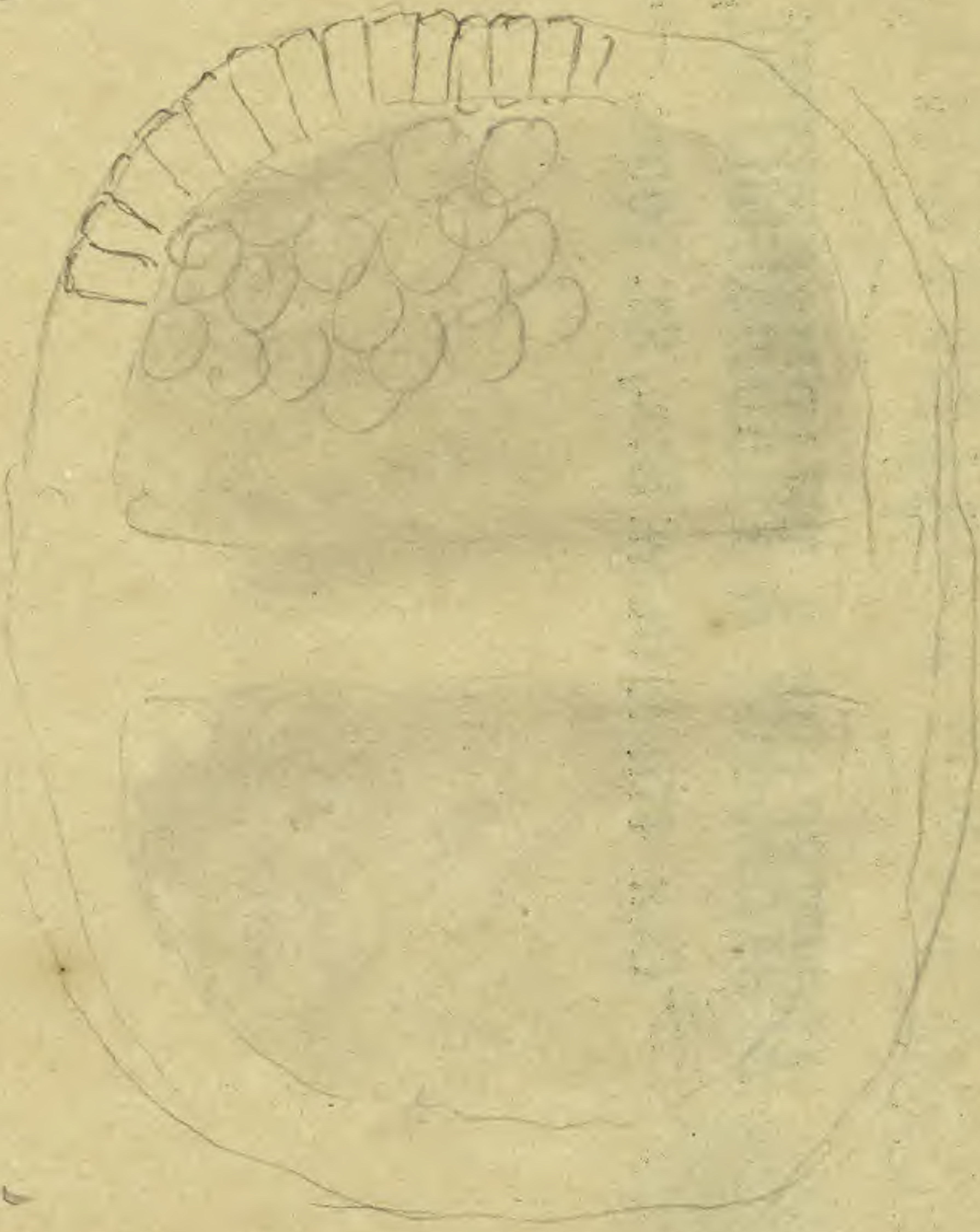
Wolffia Columbiana Sept 21 1867

Athens, Ill. E Hall

× 280



incomplete ovary



incomplete anther

Among perhaps a thousand specimens examined, half a dozen were found which had a genital opening, and rudimentary pistil (without ovule) and anthers (the latter with pollen) which remained in every instance undeveloped

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Ex Herb. G. Engelmann

Wolffia Columbiana, Karst.

subimmersa, major, sphaeroidea, grandicellulosa, concolor, stomatibus paucissimis; circa tenuissima margine obscuriore cincta; et

Wolffia Brasiliensis, Wedd.
var. borealis

natans, minor, oblonga, antice subacuta, parvicellulosa, densior, supra laete viridis, subtus pallida, plus minus brunneo-maculata, stomatibus plurimis, circa tenuis, concolor (si verticaliter compressa) vel margine superiore recto obscuriore (si a latere compressa).

In lacu quodam inter Springfield et Athens in Illinois centrali, abunde cum Lemnis, Ceratophyllo, Anacharide, etc.

Leg. Elihu Hall, Sept. 1867.

0 1 2 3 4 5 6 7 8 9 10
cm
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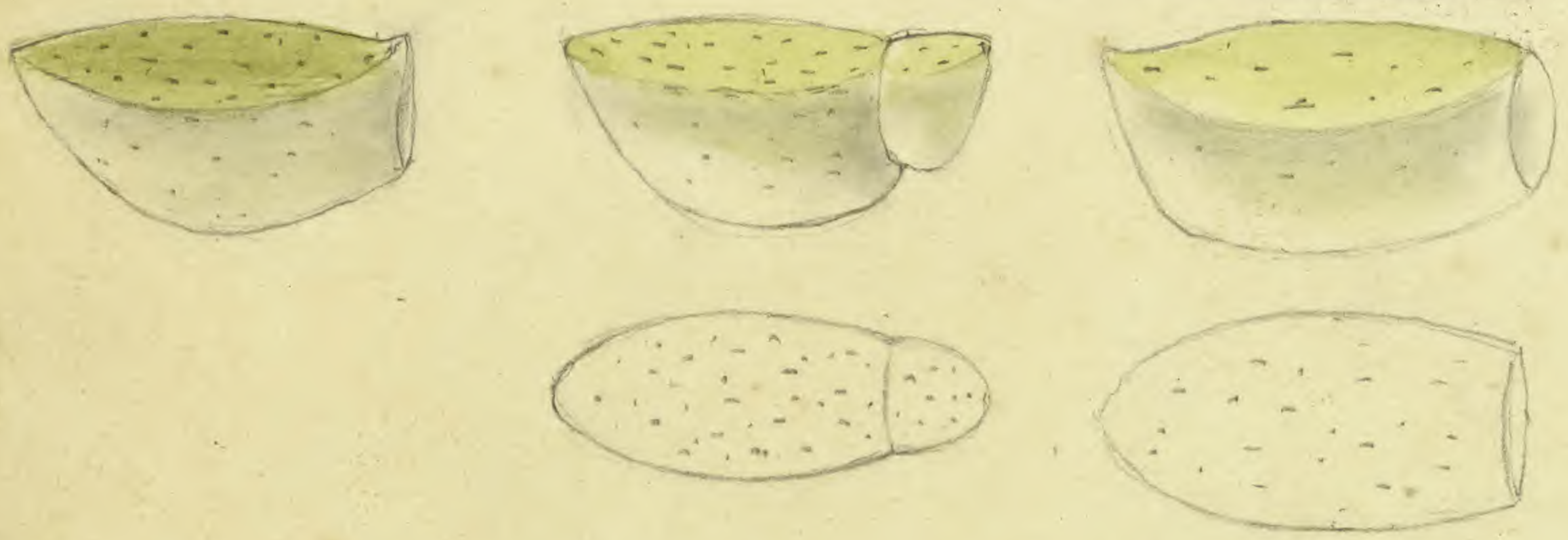
Missouri Botanical Garden

7858

Wolffia Aug 12 1867

~~Austin misit~~ ? Payne, Ontario

soaked and boiled in dilute Potash solution



Epidermis & Stomata same as in the flat colourless form figured yesterday.

$\frac{23-30}{30} = 0.8 - 1.0$

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Druggists
Cor: Fifth & Market Sts.. St. LOUIS, Mo.

J. McKitterick & Co 66 N Main St

7859

Wolffia in Herb. Gray Sept 10 1867

Salisbury Ct. Robbins 1829 W. Columbiana
(2-3 specimens of W. Braziliensis mixed
with it, but probably by mistake by me)

Canaan Station Robbins W. Columbiana pure
Orange Co N.Y. Austin W. Columbiana pure
Lake Ontario Paine W. Columbiana
with some W. Braziliensis.

Athens Illinois E Hall W. Columb & Brazil
always more Columbiana, when mixed
Detroit Bigelow W. Col & Braziliensis
Riv. Rouge
St Louis & Parkhome marsh W. Columb pure
N Orleans R. Hall in Hb. Durand & Torr W. Columbiana pure

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[illegible]

7860

for Gray Jan 1868 nearly 2/3"

Wolffia Brasiliensis, Weddell; fronds oblong, 1/4 - 1/2" long

more densely cellular
√ flattish ~~and~~ deep green above, with numerous stomata, ~~thick and,~~ ~~and spongy~~ ~~or hemispherical~~ tumid ~~below~~ pale below; ~~with the~~ anterior edge sharp, the nearly circular proliferous opening at the base ~~with a thin border~~ as in the other species; the whole surface (with brown dots more or less marked); when dry all green or green only on a straight edge. — Floating on the surface of stagnant waters, always, thus far, with the other species on Ontario [illegible], near Detroit Bigelow and in Illinois E Hall — the specimens of the latter a often ~~almost~~ dotless when young. The fruiting plant, a little smaller and more strongly dotted than ours, was discovered by Weddell in Brazil; the ~~Lemna~~ L. arrhiza of the old world is (a little larger, very similar but) with larger stomata and without dots.

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Tabel No 4

5, ~~After~~ The remarks made above and in the last number make it almost unnecessary to say any thing more ~~another word~~ about the meteorological condition of the autumn, I have not noted a warmer autumn in the last 32 years with the exception of those of 1854 and 1865, nor a drier one, except those of 1844 and 1845, nor a clearer and fairer one, unless it was that of 1851.

7861

Sept 9 1867

Annales des Sciences Naturelles
III^e série, Botanique tom 12 Paris 1849

pag. 155 Observations sur une espèce nouvelle de Wolffia - pl. VIII.

p. 159 young plants, buds just detached have cells full of amylon, which by and by diminishes and disappears.
Young buds, still enclosed, show already rudiments of buds themselves; while the Lemnae produce their buds bifariously the Wolffiae do it in a zigzag line [approaching a straight axis].

p. 160 W. Brasiliensis ~~has~~ similar to arrhiza, but is distinguished by nodules of brown colour slightly prominent, evidently a deposit of some kind in some of the epidermis cells.
epidermis cells angular, with straight lines, ~~not~~ as in W. arrhiza, not sinuous as in all Lemnae
Stomata only on the upper surface, much like arrhiza
Fruiting specimens show the development of the flower already in the youngest conditions; those that do not exhibit it then do not develope it at all.
stamen behind* the pistil and a little lower — no floral envelopes

*) Weddell calls it regularly anterior; le pistil se trouve appliqué sur la face posterieure de l'étamine. — Then, of course, the proliferous opening is posterior and that is more correct than my nomenclature

p. 161 The anther has only one cell with a transverse dehiscence; but that cell is, before opening, divided by a kind of false dissepiment [in the same direction as the line of dehiscence] which soon disappears leaving a trace between the valves
Stigma & anther scarcely exceeding surface of plant.

162 Ovule erect basilar, or rather a little oblique
On line of dehiscence of anthers as well as on stigma & style same brown cells as on epidermis

pag 163 The ripe fruit is nearly globular and fills the whole plant almost

p. 164 fruit an utricle which does not open, but may rot away testa thick [seed smooth with two darker spots, the micropyle above and the Chalaza below] coloured violet by Iodine

The Secundina (tegument interne) is very distinct in the unripe seed, cylindric, and terminates upwards with a dark coloured thick part, which forms the dark spot at the Chalaza, [and the

p. 165 In this secundin is a cavity the walls of which are beginning to be coated by the forming perisperm and from the top of which the Embryo is suspended (the suspensor fleshy) Soon the cavity is filled by perisperm and Embryo and the secundin becomes an inconspicuous membrane, only the upper and lowest part remain thick, dark and conspicuous, the former is the operculum (coiffe)

p. 166 The persistance of the suspensor, which becomes a real ligament is peculiar to all Lemnaceae in which the "coiffe" or embryotega exists [not in all ??]

On the top of the embryo proper, not far from where the suspensor is inserted, is the „fente gemmulaire"

p. 169. 170 Wolffia Hork. Schleid Linn 13. 389
W. Micheli Schleid. Mon. Lemn. Beitraege zur Botanik Leipz 1844 I p. . .
W. Delilei Schleid. Lin 13
W. Brasiliensis Wedd.

Hoffmann, Anatomy of the frond of Lemna arrhiza in Tydschrift voor natuurlyke Geschiedenes etc with plates.

fig 2

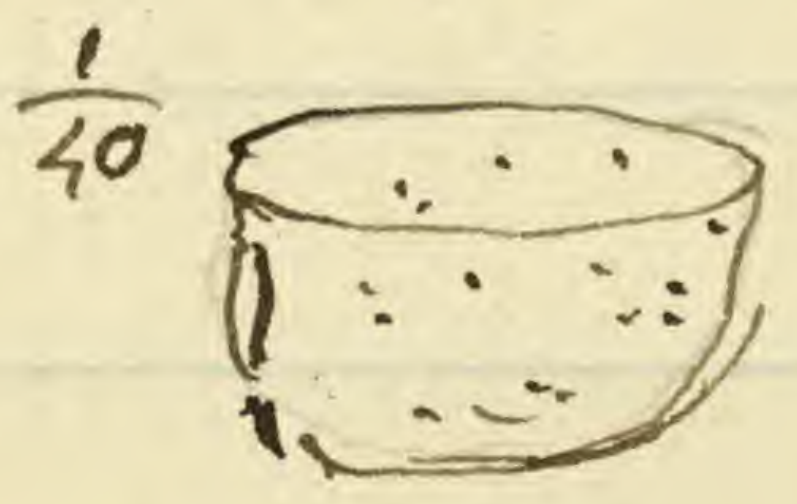


fig 8

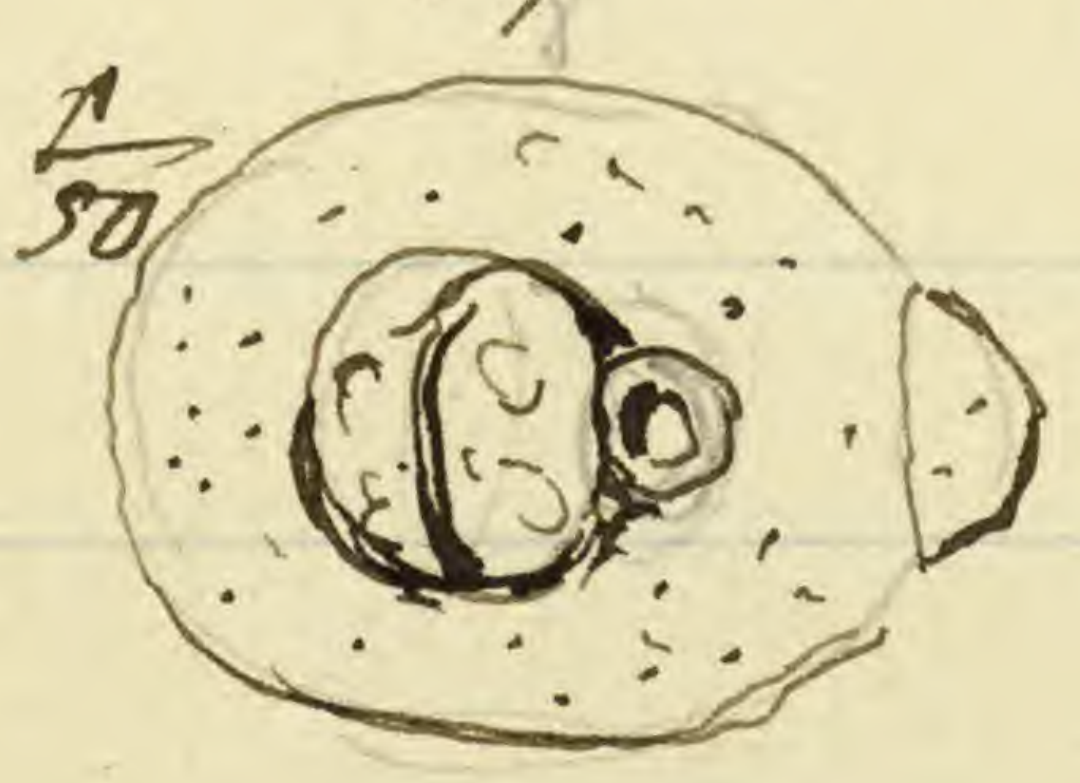


fig 9

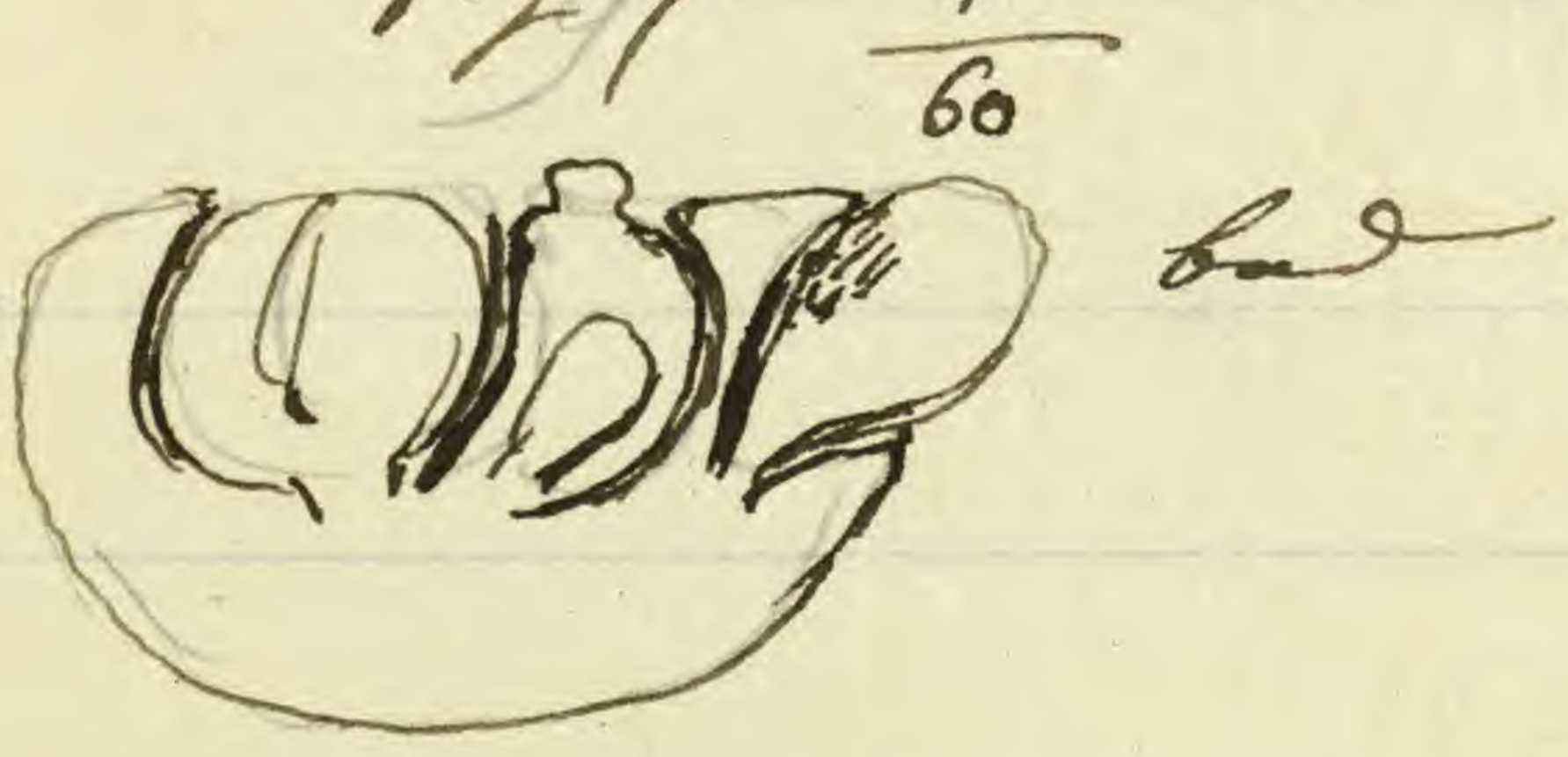
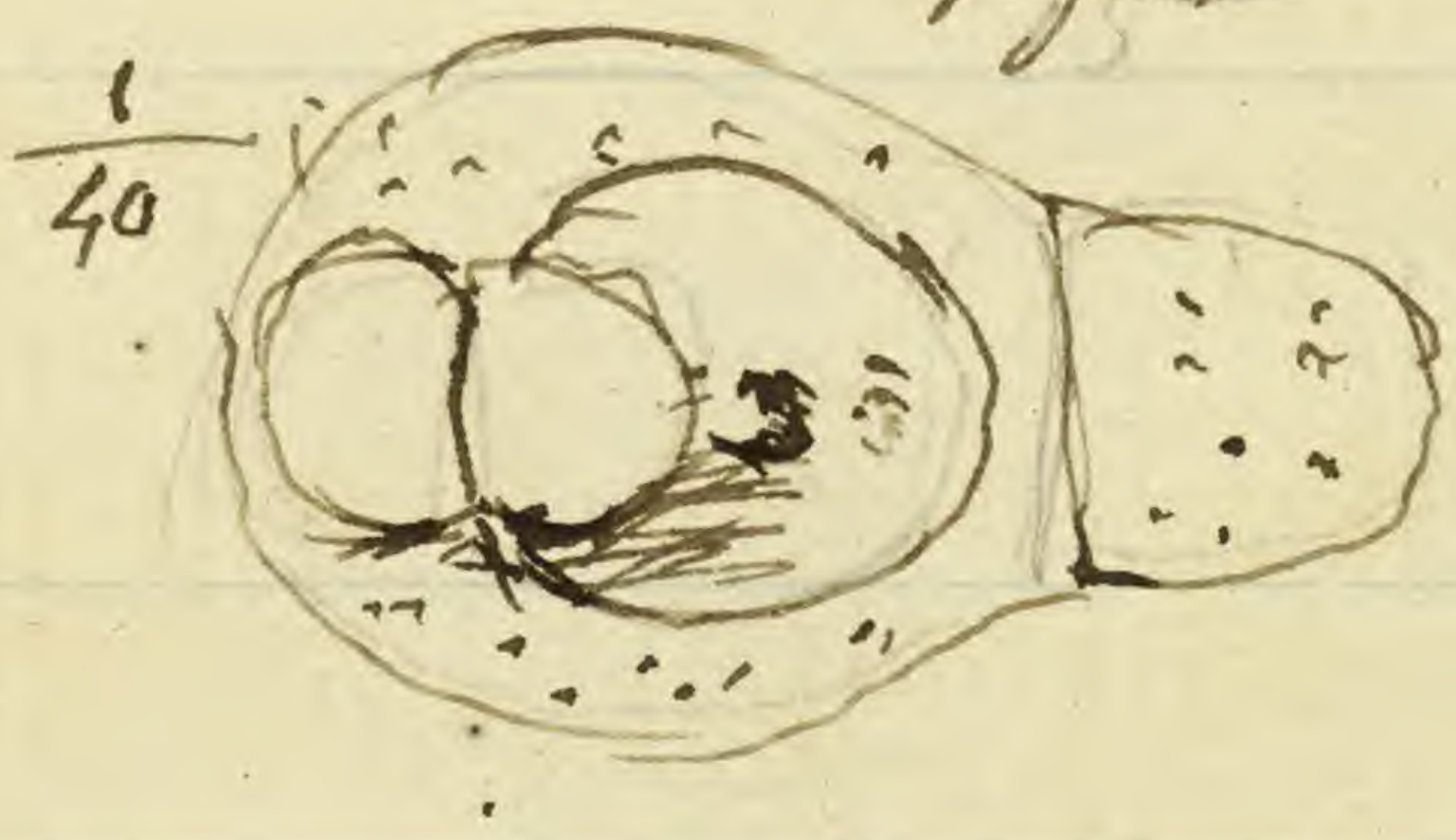


fig 15



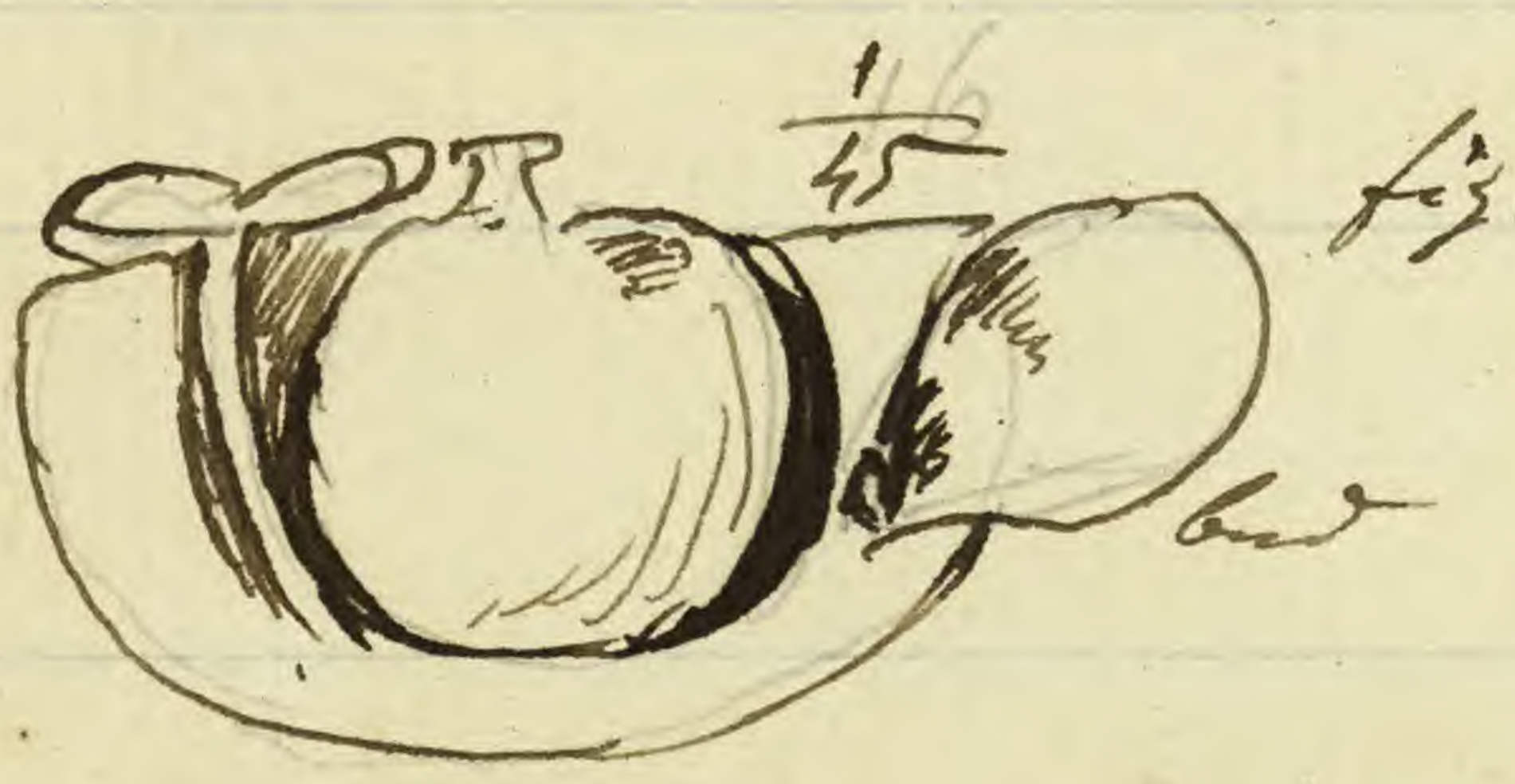
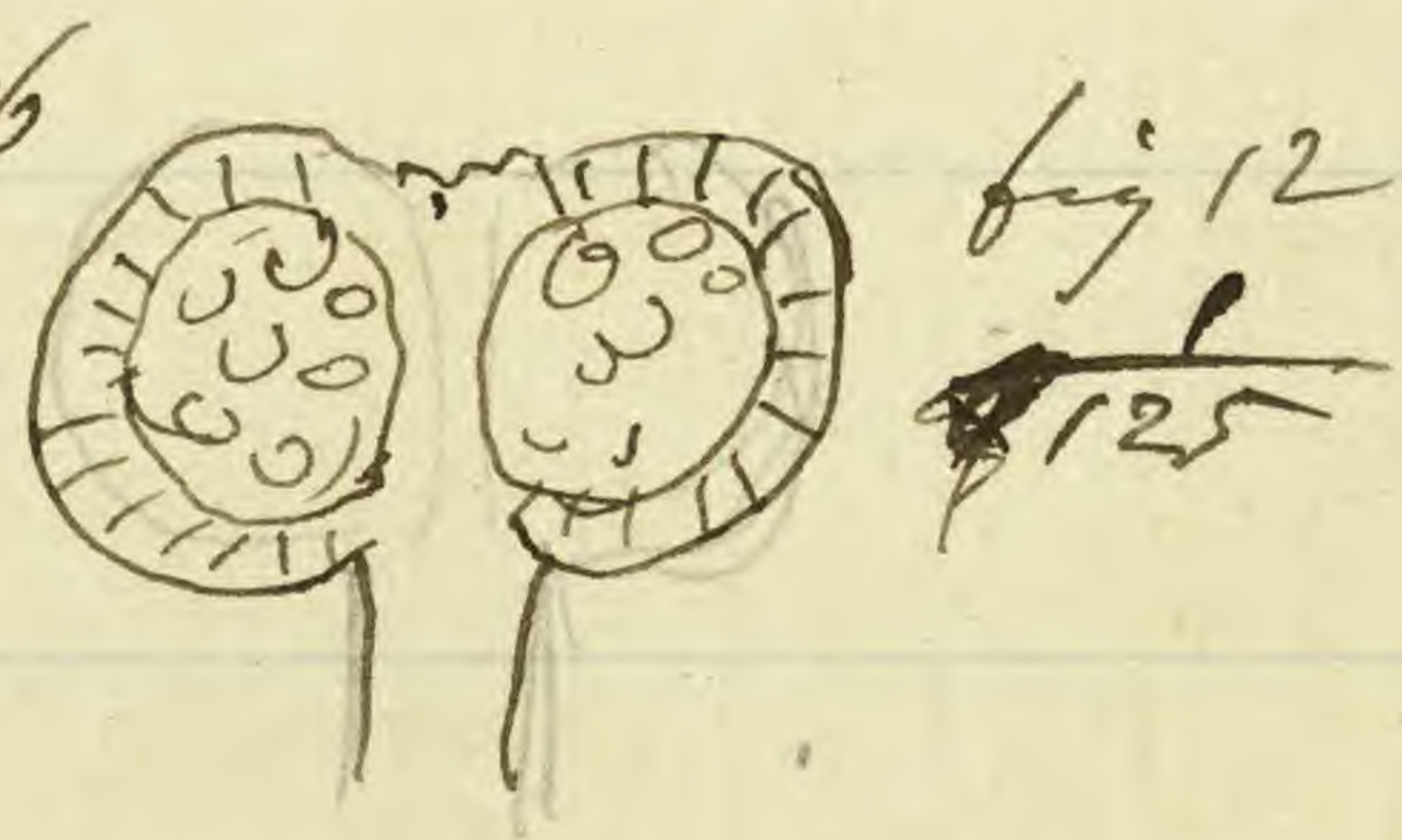
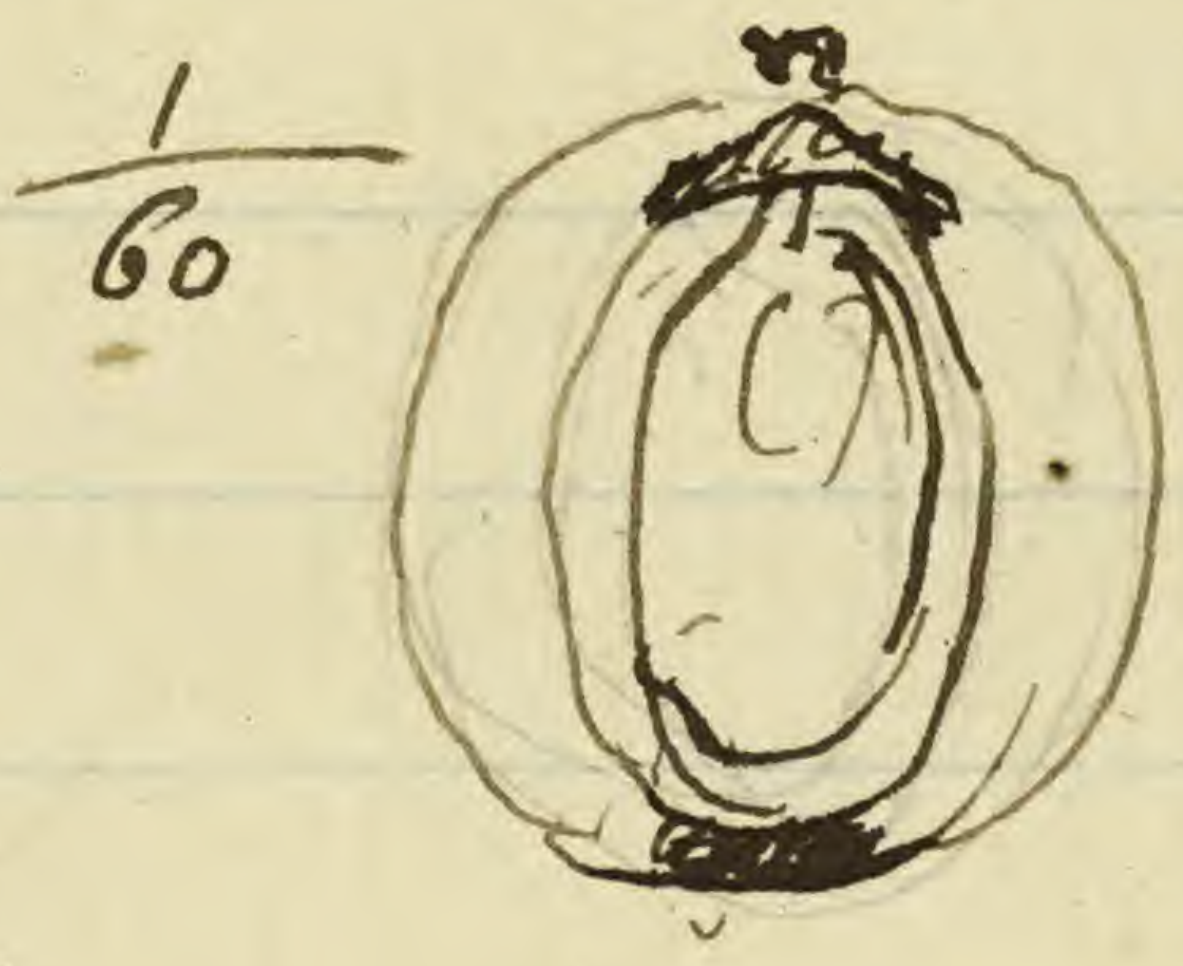


fig 16

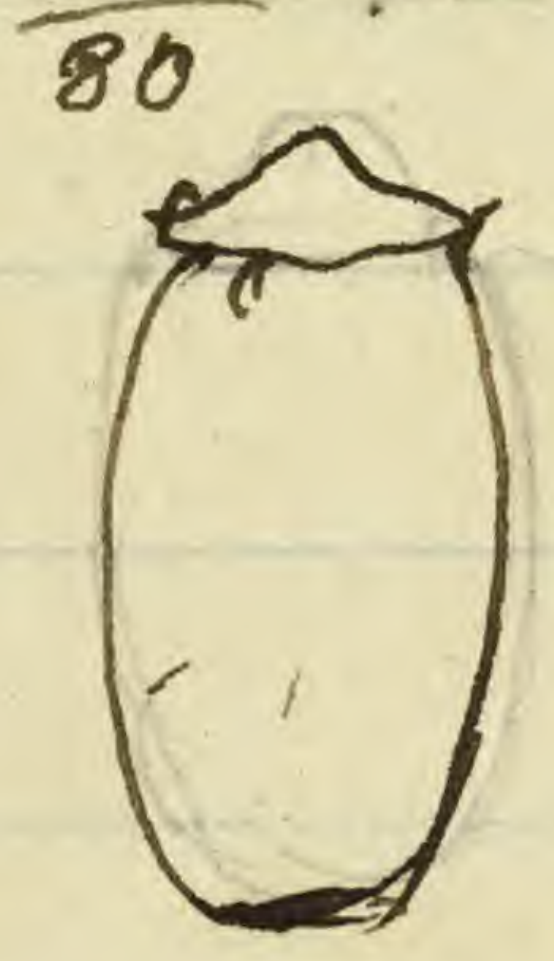
fig 12



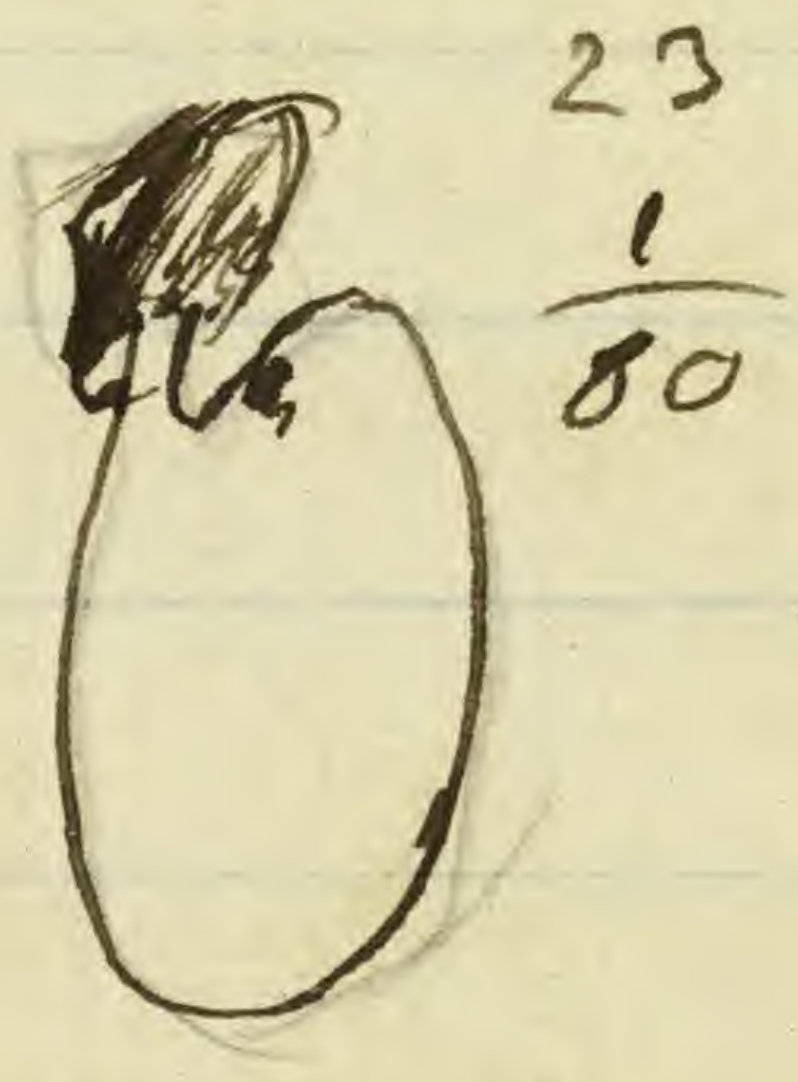
21 fig 21



22



23



2. young sterile, 8 fertile, ~~top~~ flowering view, showing anther and pistil 9 sect. of fertile frond.
12 anther, section, showing dissepiment.
15. fruit bearing frond, flat or reflexed valves of anther partly overlapping fruit.
16. section of same.
21 fruit, section. 22 embryo with the coiffe
23 coiffe somewhat removed, showing the suspensor and the fente gemmulaire.

dimensions of plantes, length without the bud

fig 2 $\frac{16}{40}$ = 0.40 mm

0.4 – 0.8 mm.

8. $\frac{23}{50}$ = 0.46
15 $\frac{26}{40}$ = 0.65
16 $\frac{38}{45}$ = 0.84

Epidermis cells $\frac{2\frac{1}{3}-4\frac{1}{2}}{300}$ mm diamet. = 0.008 – 0.014 mm
stomata & their cells nearly $\frac{5}{300}$ long = 0.016 mm long
if correctly represented, a great deal smaller than those of my northern plant which are cells 0.018 – 0.028 mm diam.
stomata 0.025 – 0.028 mm long

7862